INSTALLATION MANUAL

R-410A
XP SERIES

3 - 5 Ton

60 Hertz

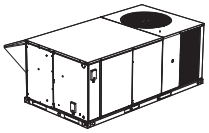


TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

General

YORK® Model XP units are single package heat pumps equipped with optional factory installed electric heaters. These units are designed for outdoor installation on a rooftop or slab.

The units are completely assembled on rigid, permanently attached base rails. All piping, refrigerant charge, and electrical wiring is factory installed and tested. The units require electric power, duct connections and fixed outdoor air intake damper (units without economizer or motorized damper option only) at the point of installation.

The supplemental electric heaters have nickel-chrome elements and utilize single point power connection.

Safety Considerations

This is a safety alert symbol. When you see this symbol on labels or in manuals, be alert to the potential for personal injury.

Understand and pay particular attention the signal words **DANGER**, **WARNING** or **CAUTION**.

DANGER indicates an **imminently** hazardous situation, which, if not avoided, **will result in death or serious injury.**

WARNING indicates a **potentially** hazardous situation, which, if not avoided, **could result in death or serious injury.**

CAUTION indicates a potentially hazardous situation, which, if not avoided **may result in minor or moderate injury.** It is also used to alert against unsafe practices and hazards involving only property damage.

⚠WARNING

Improper installation may create a condition where the operation of the product could cause personal injury or property damage. Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual for assistance or for additional information, consult a qualified contractor, installer or service agency.

⚠ CAUTION

This product must be installed in strict compliance with the installation instructions and any applicable local, state and national codes including, but not limited to building, electrical, and mechanical codes.

⚠WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury. Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual. For assistance or additional information consult a qualified installer or service agency.

⚠ CAUTION

This system uses R-410A Refrigerant which operates at higher pressures than R-22. No other refrigerant may be used in this system. Gage sets, hoses, refrigerant containers and recovery systems must be designed to handle R-410A. If you are unsure, consult the equipment manufacturer. Failure to use R-410A compatible servicing equipment may result in property damage or injury.

Due to system pressure, moving parts, and electrical components, installation and servicing of air conditioning equipment can be hazardous. Only qualified, trained service personnel should install, repair, or service this equipment. Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters.

Observe all precautions in the literature, labels, and tags accompanying the equipment whenever working on air conditioning equipment. Be sure to follow all other applicable safety precautions and codes that apply.

Wear safety glasses and work gloves. Use quenching cloth and have a fire extinguisher available during brazing operations.

Inspection

As soon as a unit is received, it should be inspected for possible damage during transit. If damage is evident, the extent of the damage should be noted on the carrier's freight bill. A separate request for inspection by the carrier's agent should be made in writing.

Reference

Additional information is available in the following reference forms:

- Technical Guide - ZJ036-060 / XP036-060, 251933
- General Installation - XP036-060, 362251

Renewal Parts

Contact your local York® parts distribution center for authorized replacement parts.

Approvals

Design certified by CSA as follows:

1. For use as a heat pump only with or without optional electric heat.
2. For outdoor installation only.
3. For installation on combustible material.

⚠ CAUTION

This product must be installed in strict compliance with the enclosed installation instructions and any applicable local, state, and national codes including, but not limited to, building, electrical, and mechanical codes.

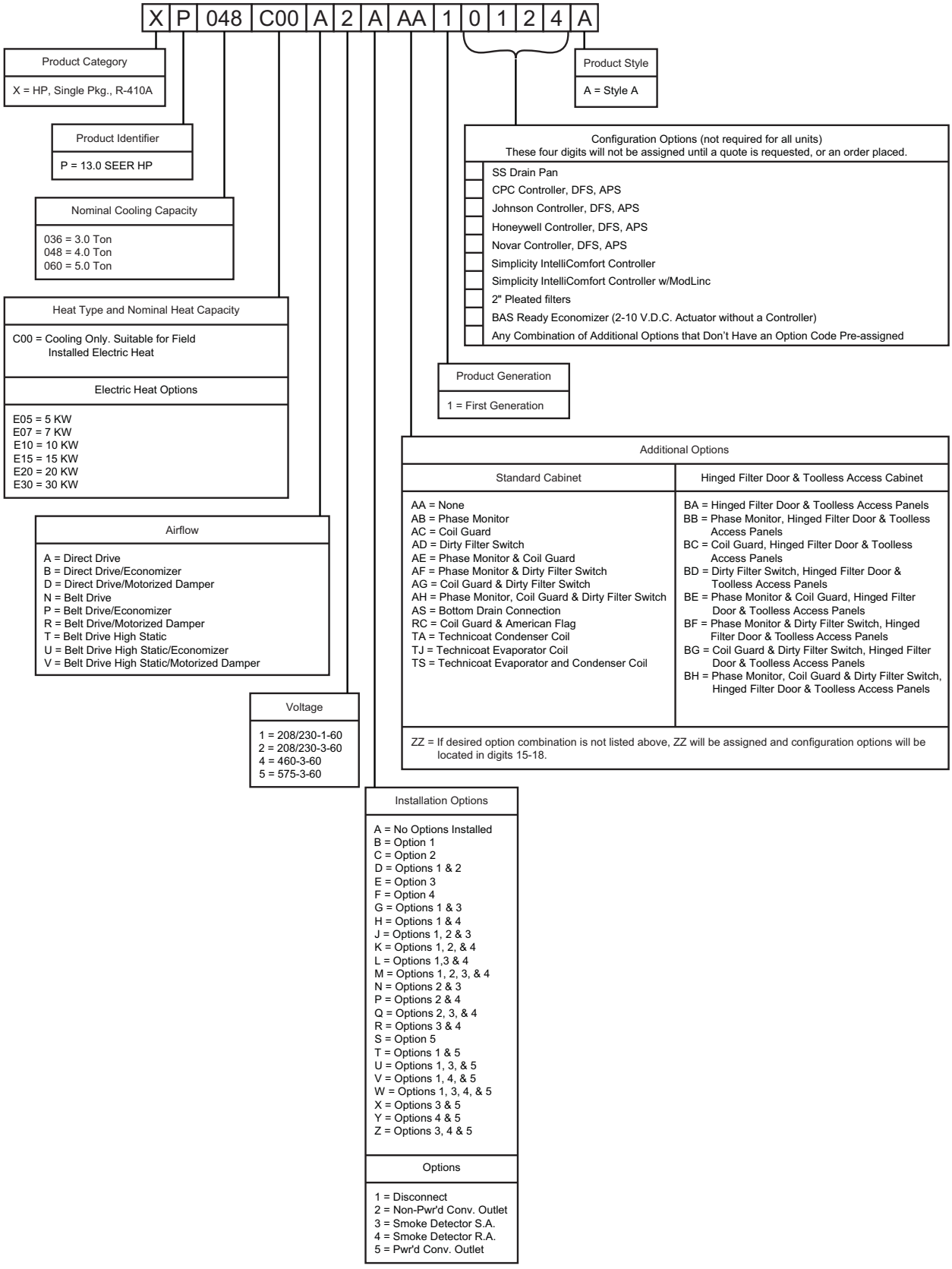
⚠WARNING

Improper installation may create a condition where the operation of the product could cause personal injury or property damage.

⚠ CAUTION

This system uses R-410A Refrigerant which operates at higher pressures than R-22. No other refrigerant may be used in this system.

Nomenclature



Installation

Installation Safety Information

Read these instructions before continuing this appliance installation. This is an outdoor combination heating and cooling unit. The installer must assure that these instructions are made available to the consumer and with instructions to retain them for future reference.

1. Install this unit only in a location and position as specified on Page 6 of these instructions.
2. This equipment is not to be used for temporary heating of buildings or structures under construction.
3. If a factory option convenience outlet is installed, the weatherproof outlet cover must be field installed. The cover shall be located behind the blower access panel. To install the cover, remove the shipping label covering the convenience outlet and attach the cover to the unit using the (4) screws provided.

⚠ CAUTION

208/230-3-60 and 380/415-3-50 units with factory installed Powered Convenience Outlet Option are wired for 230v and 415v power supply respectively. Change tap on transformer for 208-3-60 or 380-3-50 operation. See unit wiring diagram.

Limitations

These units must be installed in accordance with the following:

In U.S.A.:

1. National Electrical Code, ANSI/NFPA No. 70 - Latest Edition
2. Local building codes
3. Local utility requirements

In Canada:

1. Canadian Electrical Code, CSA C22.1
2. Local plumbing and waste water codes
3. Other applicable local codes.

Refer to unit application data found in this document.

If components are to be added to a unit to meet local codes, they are to be installed at the dealer's and/or customer's expense.

Size of unit for proposed installation should be based on heat loss/heat gain calculation made according to the methods of Air Conditioning Contractors of America (ACCA).

This unit is not to be used for temporary heating of buildings or structures under construction.

⚠ CAUTION

The Simplicity® control board used in this product will effectively operate the cooling system down to 0°F when this product is applied in a comfort cooling application for people. An economizer is typically included in this type of application. When applying this product for process cooling applications (computer rooms, switchgear, etc.), please reference applications bulletin AE-011-07 or call the applications department for Unitary Products @ 1-877-UPG-SERV for guidance. Additional accessories may be needed for stable operation at temperatures below 30° F.

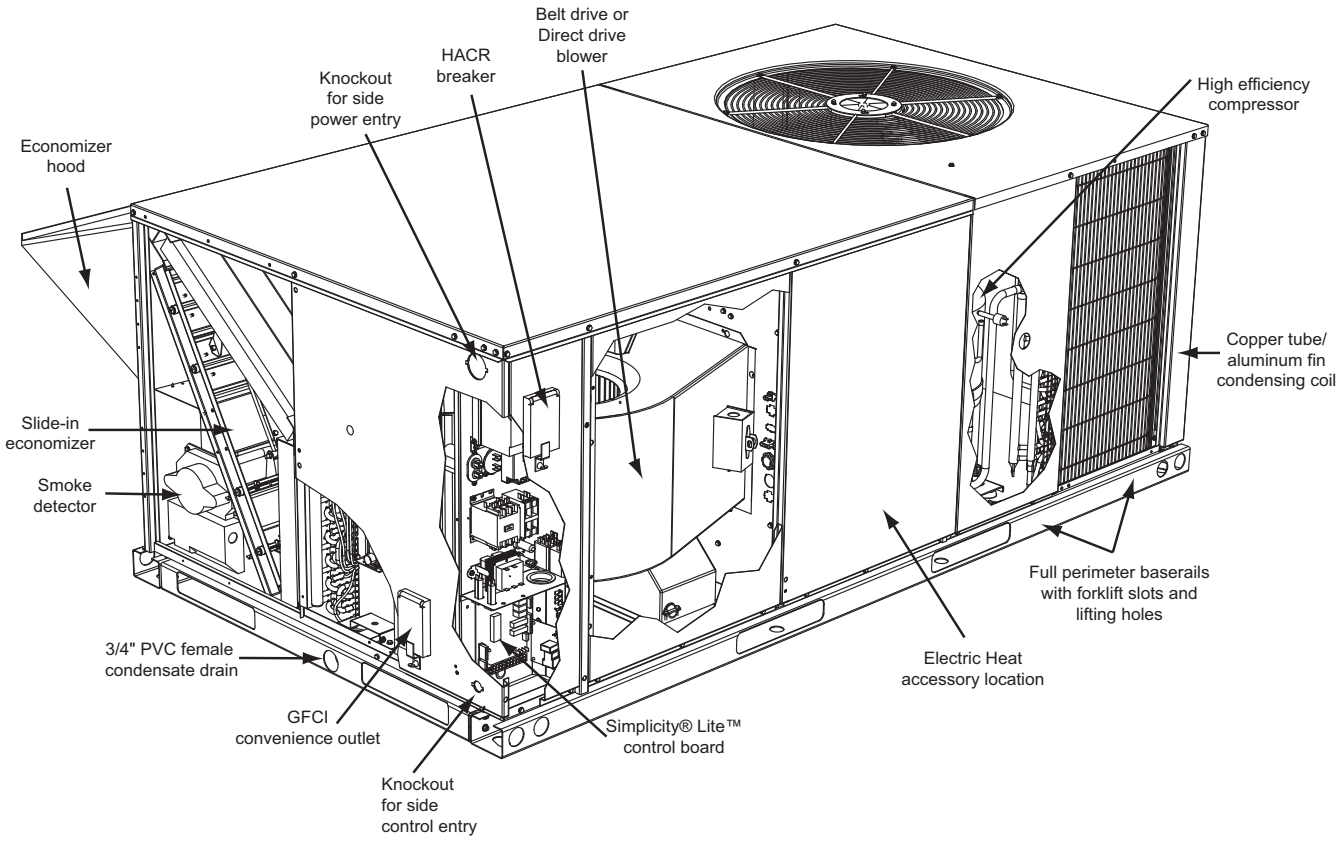


Figure 1: XP036-060 Component Location

Table 1: XP036-060 Unit Limitations

Size (Tons)	Unit Voltage	Unit Limitations		
		Applied Voltage		Outdoor DB Temp
		Min	Max	Max (°F)
036 (3.0)	208/230-1-60	187	252	125
	208/230-3-60	187	252	125
	460-3-60	432	504	125
	575-3-60	540	630	125
048 (4.0)	208/230-1-60	187	252	125
	208/230-3-60	187	252	125
	460-3-60	432	504	125
	575-3-60	540	630	125
060 (5.0)	208/230-1-60	187	252	125
	208/230-3-60	187	252	125
	460-3-60	432	504	125
	575-3-60	540	630	125

Location

Use the following guidelines to select a suitable location for these units:

1. Unit is designed for *outdoor installation only*.
2. Condenser coils must have an unlimited supply of air. Where a choice of location is possible, position the unit on either north or east side of building.
3. Suitable for mounting on roof curb.
4. For ground level installation, use a level concrete slab with a minimum thickness of 4 inches. The length and width should be at least 6 inches greater than the unit base rails. Do not tie slab to the building foundation.
5. Roof structures must be able to support the weight of the unit and its options/accessories. Unit must be installed on a solid, level roof curb or appropriate angle iron frame.

6. Maintain level tolerance to 1/2” across the entire width and length of unit.

Clearances

All units require particular clearances for proper operation and service. Installer must make provisions for adequate ventilation air. Refer to Table 4 for clearances required for construction, servicing, and proper unit operation.

⚠WARNING

Do not permit overhanging structures or shrubs to obstruct condenser air discharge outlet.

Rigging And Handling

Exercise care when moving the unit. Do not remove any packaging until the unit is near the place of installation. Rig the unit by attaching chain or cable slings to the lifting holes provided in the base rails. Spreader bars, whose length exceeds the largest dimension across the unit, **MUST** be used across the top of the unit.

⚠ CAUTION

If a unit is to be installed on a roof curb other than a York® roof curb, gasketing must be applied to all surfaces that come in contact with the unit underside.

⚠ CAUTION

Before lifting, make sure the unit weight is distributed equally on the rigging cables so it will lift evenly.

Units may be moved or lifted with a forklift. Slotted openings in the base rails are provided for this purpose.

LENGTH OF FORKS MUST BE A MINIMUM OF 42 INCHES.

⚠ CAUTION

All panels must be secured in place when the unit is lifted.

The condenser coils should be protected from rigging cable damage with plywood or other suitable material.

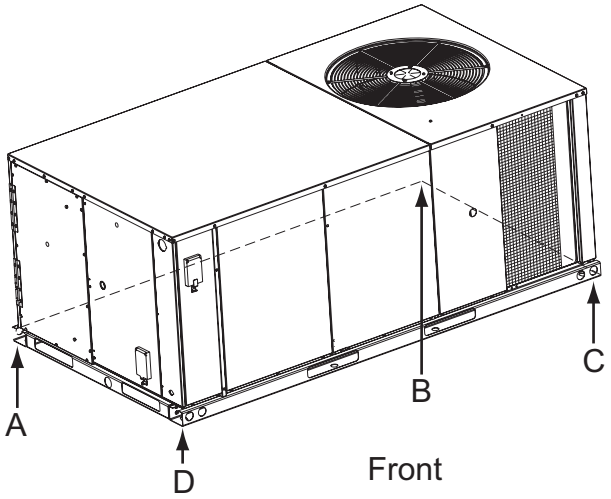


Figure 2: Unit 4 Point Load Weight

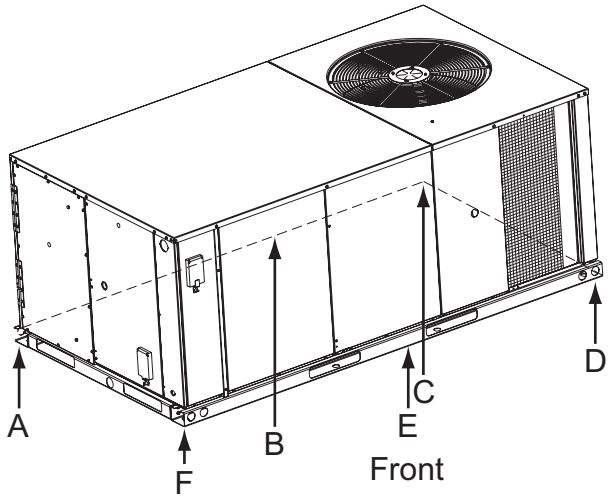


Figure 3: Unit 6 Point Load Weight

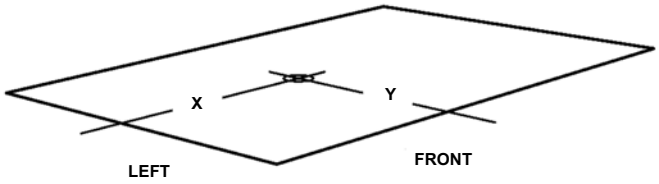


Figure 4: Center of Gravity

Table 2: Weights and Dimensions

Size	Weight (lbs.)		Center of Gravity		4 Point Load Location (lbs.)				6 Point Load Location (lbs.)					
(Tons)	Shipping	Operating	X	Y	A	B	C	D	A	B	C	D	E	F
036 (3.0)	580	575	39	20	135	121	151	168	91	85	80	99	106	114
048 (4.0)	590	585	39	20	137	124	154	171	93	87	81	101	108	116
060 (5.0)	595	590	39	20	138	125	155	172	94	87	82	102	109	117

Table 3: XP036-060 Unit Accessory Weights

Unit Accessory	Weight (lbs.)	
	Shipping	Operating
Economizer	55	50
Power Exhaust	55	50
Electric Heat[1]	28	28

1. Weight given is for the maximum heater size available (30KW).

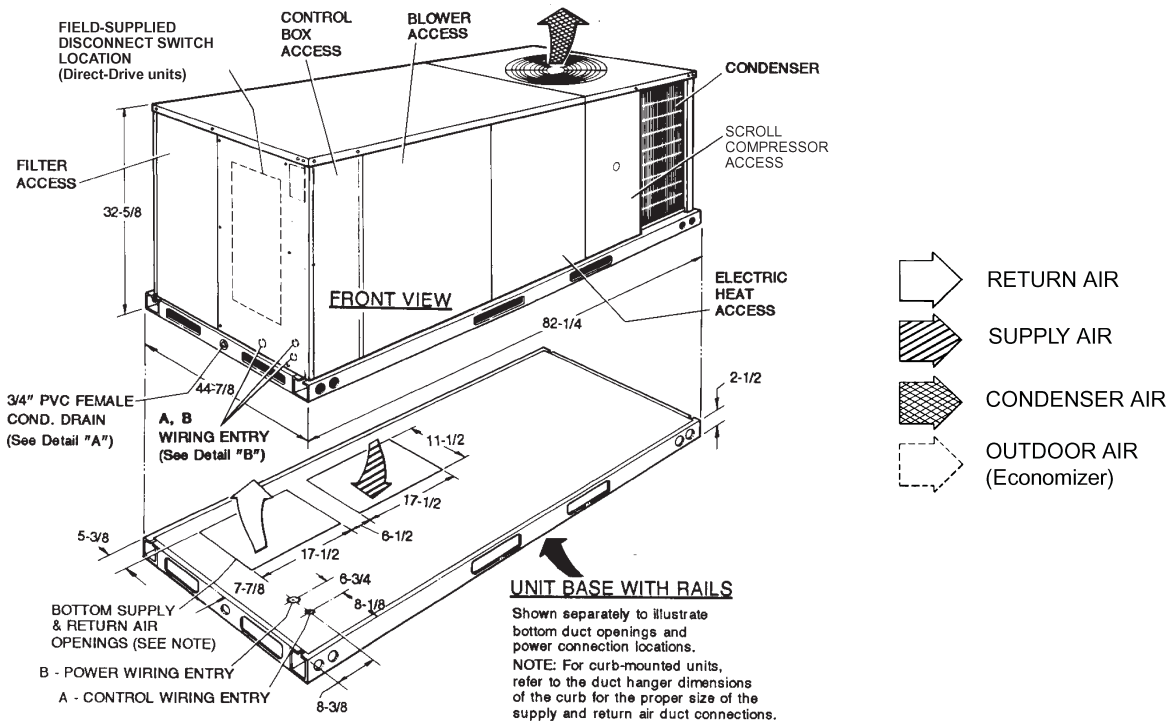


Figure 5: XP036-060 Heat Pump/Electric Heat Front View Physical Dimensions

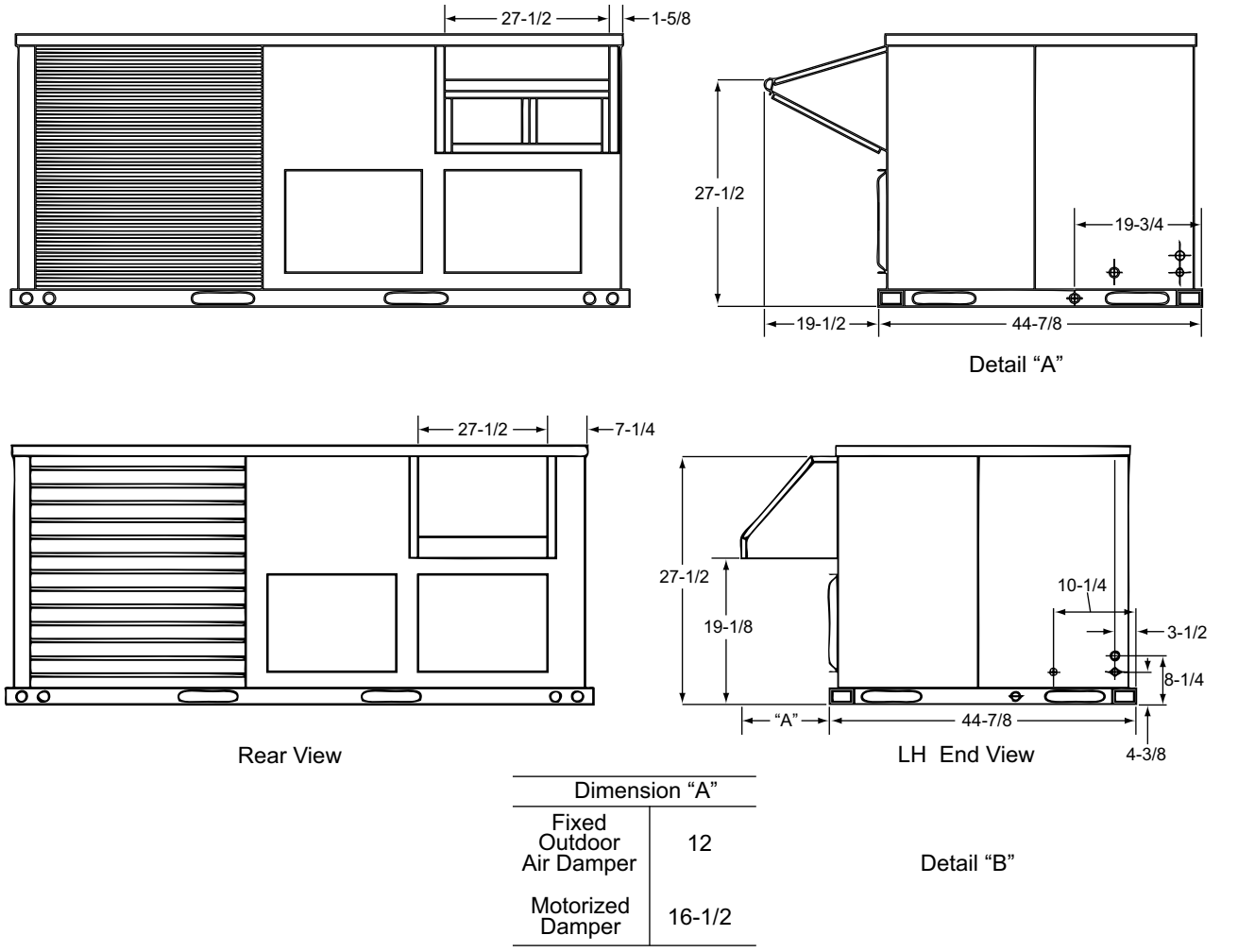


Figure 6: XP036-060 Fixed Outdoor Air Motorized Damper Rain Hood Physical Dimensions

Table 4: XP036-060 Unit Clearances

Location	Clearance
Front	24" (Cooling/Electric Heat)
Rear	12" (Less Economizer) 36" (With Economizer or Fixed Air/Motorized Damper)
Left Side (Filter Access)	24" (Less Economizer) 36" (With Economizer)
Right Side (Cond. Coil)	24"
Below Unit[1]	0"
Above Unit[2]	72" (For Condenser Air Discharge)

1. Units may be installed on combustible floors made from wood or class A, B, or C roof covering material.
2. Units must be installed outdoors. Overhanging structures or shrubs should not obstruct condenser air discharge outlet.

NOTE: Units and ductwork are approved for zero clearance to combustible materials when equipped with electric heaters.

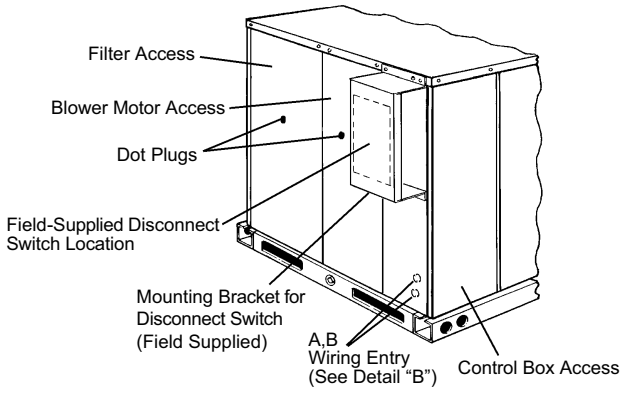
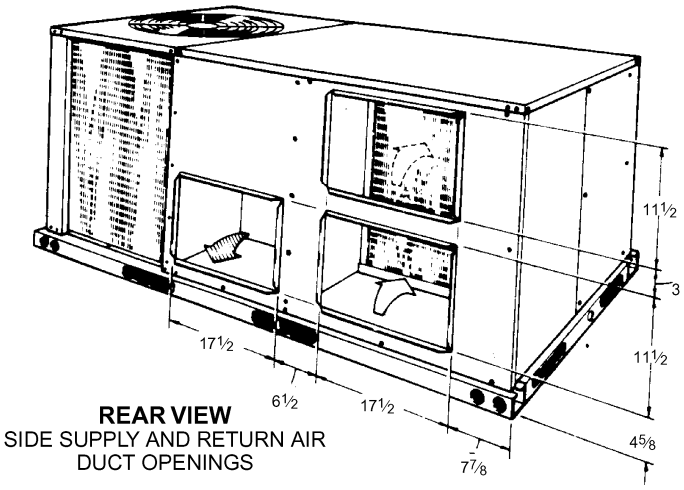


Figure 7: XP036-060 Disconnect Location



REAR VIEW
SIDE SUPPLY AND RETURN AIR
DUCT OPENINGS

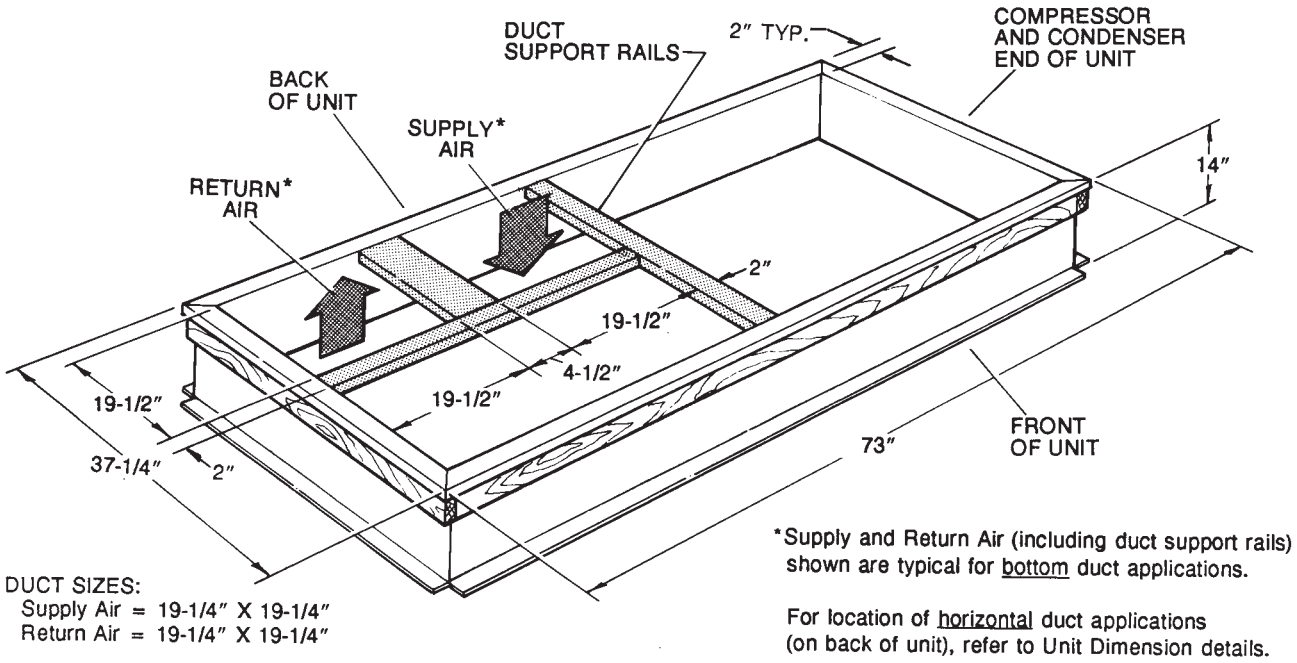
DUCT COVERS - Units are shipped with all air duct openings covered.
For side duct applications;
1.Remove and discard the supply and return air duct covers.
2.Connect ductwork to duct flanges on the rear of the unit.
For bottom duct applications;
1. Remove the side supply air duct cover to gain access to the bottom supply air knockout panel.
2. Remove and discard the bottom knockout panel.
3. Replace the side duct cover.
4. With filter section access panel removed from the unit, remove and discard the bottom return air knockout panel.
5. Replace the filter access panel.

Figure 8: XP036-060 Unit Side Duct Openings

Table 5: XP036-060 Utilities Entry

Hole	Opening Size (Dia.)	Used For	
A	7/8" KO[1]	Control Wiring	Side
			Bottom[2]
B	2" KO[1]	Power Wiring	Side
			Bottom

1. Opening in the bottom to the unit can be located by the slice in the insulation.
2. Do not remove the 2" knockout ring.



*Supply and Return Air (including duct support rails) shown are typical for bottom duct applications.

For location of horizontal duct applications (on back of unit), refer to Unit Dimension details.

Figure 9: XP036-060 Roof Curb

Ductwork

Ductwork should be designed and sized according to the methods in Manual D of the Air Conditioning Contractors of America (ACCA) or as recommended by any other recognized authority such as ASHRAE or SMACNA.

A closed return duct system should be used. This will not preclude use of economizers or outdoor fresh air intake. The supply and return air duct connections at the unit should be made with flexible joints to minimize noise.

The supply and return air duct systems should be designed for the CFM and static pressure requirements of the job. They should NOT be sized to match the dimensions of the duct connections on the unit.

Refer to Figure 5 for bottom air duct openings. Refer to Figure 8 for side air duct openings.

⚠ CAUTION

When fastening ductwork to side duct flanges on unit, insert screws through duct flanges only. DO NOT insert screws through casing. Outdoor ductwork must be insulated and water-proofed.

Condensate Drain

Plumbing must conform to local codes. Use a sealing compound on male pipe threads. Install a condensate drain line from the 3/4” PVC female connection on the unit to an open drain.

NOTE: The condensate drain operates in a negative pressure in the cabinet. The condensate drain line MUST be trapped to provide proper drainage. See Figure 10.

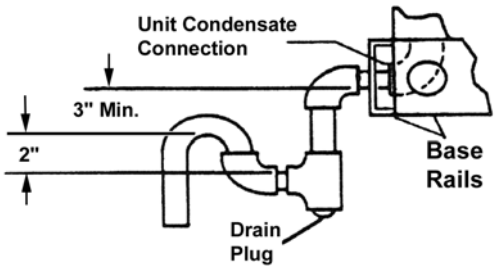


Figure 10: Condensate Drain

Compressors

The scroll compressor used in this product is specifically designed to operate with R-410A Refrigerant and cannot be interchanged.

⚠ CAUTION

This system uses R-410A Refrigerant which operates at higher pressures than R-22. No other refrigerant may be used in this system.

The compressor also uses a polyolester (POE oil), Mobil 3MA POE. This oil is extremely hygroscopic, meaning it absorbs water readily. POE oil can absorb 15 times as much water as other oils designed for HCFC and CFC refrigerants. Take all necessary precautions to avoid exposure of the oil to the atmosphere.

⚠ CAUTION

Do not leave the system open to the atmosphere. Unit damage could occur due to moisture being absorbed by the **POE oil** in the system. This type of oil is highly susceptible to moisture absorption

POE (polyolester) compressor lubricants are known to cause long term damage to some synthetic roofing materials.

⚠ CAUTION

Exposure, even if immediately cleaned up, may cause embrittlement (leading to cracking) to occur in one year or more. When performing any service that may risk exposure of compressor oil to the roof, take precautions to protect roofing.

Procedures which risk oil leakage include, but are not limited to, compressor replacement, repairing refrigerant leaks, replacing refrigerant components such as filter drier, pressure switch, metering device or coil.

Units are shipped with compressor mountings which are factory-adjusted and ready for operation.

Units with scroll compressors have a shipping bracket which must be removed after the unit is set in place. See Figure 11.

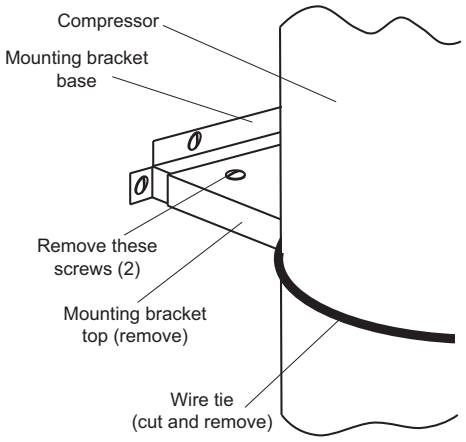


Figure 11: Compressor Restraining Bracket

⚠ CAUTION

Do not loosen compressor mounting bolts.

Filters

One or two-inch filters can be supplied with each unit. One-inch filters may be used with no modification to the filter racks. Filters must always be installed ahead of evaporator coil and must be kept clean or replaced with same size and type. Dirty filters reduce the capacity of the unit and result in frosted coils or safety shutdown. Refer to physical data tables, for the number and size of filters needed for the unit. The unit should not be operated without filters properly installed.

⚠ CAUTION

Make sure that panel latches are properly positioned on the unit to maintain an airtight seal.

Power And Control Wiring

Field wiring to the unit, fuses, and disconnects must conform to provisions of National Electrical Code (NEC), ANSI/NFPA No. 70 – Latest Edition (in U.S.A.), current Canadian Electrical Code C221, and/or local ordinances. The unit must be electrically grounded in accordance with NEC and CEC as specified above and/or local codes.

Voltage tolerances which must be maintained at the compressor terminals during starting and running conditions are indicated on the unit Rating Plate and Table 1.

⚠ CAUTION

208/230-3-60 and 380/415-3-50 units control transformers are factory wired for 230v and 415v power supply respectively. Change tap on transformer for 208-3-60 or 380-3-50 operation. See unit wiring diagram.

The internal wiring harnesses furnished with this unit are an integral part of the design certified unit. Field alteration to comply with electrical codes should not be required. If any of the wire supplied with the unit must be replaced, replacement wire must be of the type shown on the wiring diagram and the same minimum gauge as the replaced wire.

A disconnect must be utilized for these units. Factory installed disconnects are available. If installing a disconnect (field supplied or York International® supplied accessory), refer to Figure 7 for the recommended mounting location.

⚠ CAUTION

Avoid damage to internal components if drilling holes for disconnect mounting.

NOTE: Since not all local codes allow the mounting of a disconnect on the unit, please confirm compliance with local code before mounting a disconnect on the unit.

Electrical line must be sized properly to carry the load. USE COPPER CONDUCTORS ONLY. Each unit must be wired with a separate branch circuit fed directly from the meter panel and properly fused.

Refer to Figure 12 for typical field wiring and to the appropriate unit wiring diagram mounted inside control doors for control circuit and power wiring information.

⚠ CAUTION

When connecting electrical power and control wiring to the unit, water-proof connectors must be used so that water or moisture cannot be drawn into the unit during normal operation. The above water-proofing conditions will also apply when installing a field supplied disconnect switch.

Power Wiring Detail

Units are factory wired for the voltage shown on the unit nameplate. Refer to Electrical Data Table 7 to size power wiring, fuses, and disconnect switch.

Power wiring is brought into the unit through the side of the unit or the basepan inside the curb.

Thermostat Wiring

The thermostat should be located on an inside wall approximately 56 inch above the floor where it will not be subject to drafts, sun exposure or heat from electrical fixtures or appliances. Follow the manufacturer's instructions enclosed with thermostat for general installation procedure. Seven (7) color-coded, insulated wires should be used to connect the thermostat to the unit. Refer to Table 6 for control wire sizing and maximum length.

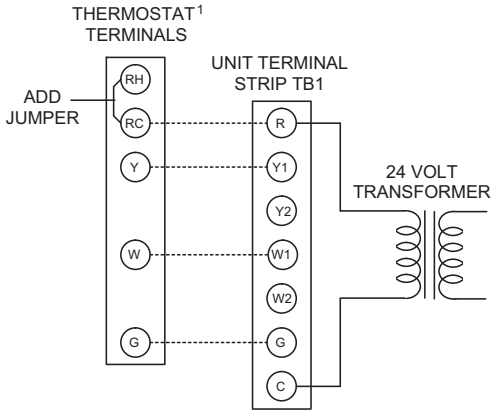
Table 6: Control Wire Sizes

Wire Size	Maximum Length[1]
18 AWG	150 Feet

1. From the unit to the thermostat and back to the unit.

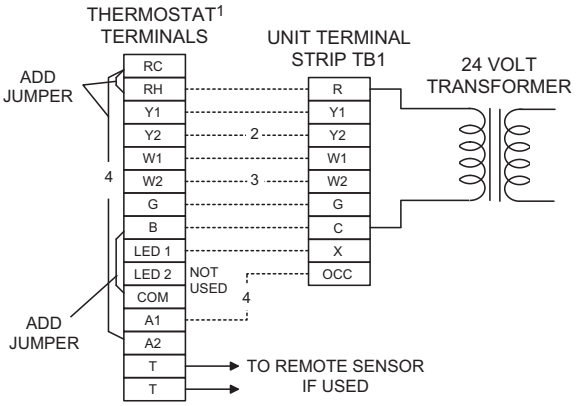
TYPICAL CONTROL WIRING

COOLING / HEATING (24 VOLT THERMOSTAT)



[1]24 VOLT THERMOSTAT. TO CONTROL THE ECONOMIZER ON THE SECOND STAGE COOLING OR TO HAVE AN ELECTRIC HEAT ACCESSORY WITH TWO STAGES OF HEAT, USE A 2 STAGE COOL AND HEAT THERMOSTAT.

COOLING / HEATING (ELECTRONIC THERMOSTAT) MULTI STAGE



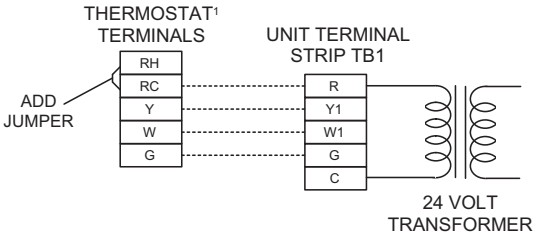
[1] ELECTRONIC PROGRAMMABLE THERMOSTAT TYPICAL.

[2] SECOND STAGE COOLING IS NOT REQUIRED ON UNITS LESS ECONOMIZER.

[3] SECOND STAGE HEATING IS ONLY REQUIRED ON UNITS WITH A TWO STAGE ELECTRIC HEATER OR 2 STAGE GAS HEAT.

[4] REMOVE JUMPER J2 FROM TERMINALS 4 AND 9 ON JUMPER PLUG CONNECTOR P6 ON UNITS WITH ECONOMIZER. TERMINALS A1 AND A2 PROVIDE A RELAY OUT-PUT TO CLOSE THE OUTDOOR ECONOMIZER DAMPERS WHEN THE THERMOSTAT SWITCHES TO THE SET-BACK POSITION.

COOLING / HEATING (ELECTRONIC THERMOSTAT) SINGLE STAGE



[1]ELECTRONIC PROGRAMMABLE THERMOSTAT TYPICAL. TO CONTROL THE ECONOMIZER ON SECOND STAGE COOLING, USE A 2 STAGE COOL AND HEAT THERMOSTAT.

Figure 12: Typical Field Power and Control Wiring

Table 7: Electrical Data

XP036-060 - Without Powered Convenience Outlet (Belt Drive)

Size (Tons)	Volt	Compressors (each)			OD Fan Motors (each)	Supply Blower Motor	Pwr Conv Outlet	Electric Heat Option				MCA[1] (Amps)	Max Fuse[2]/ Breaker[3] Size (Amps)
		RLA	LRA	MCC	FLA	FLA	FLA	Model	kW	Stages	Amps		
036 (3.0)	208-1-60	16.6	88.0	26.0	1.6	7.6	0.0	None	-	-	-	30.0	40
								E05	4.0	1	19.2	54.0	60
								E07	5.6	1	26.9	63.6	70
								E10	8.0	1	38.5	78.0	80
								E15	11.9	2	57.2	101.5	110
								E20	15.9	2	76.4	125.5	150
	230-1-60	16.6	88.0	26.0	1.6	7.6	0.0	None	-	-	-	30.0	40
								E05	5.3	1	22.1	57.6	60
								E07	7.5	1	31.3	69.0	70
								E10	10.6	1	44.2	85.2	90
								E15	15.9	2	66.3	112.8	125
								E20	21.2	2	88.3	140.4	150
	208-3-60	12.8	95.0	20.0	1.6	5.2	0.0	None	-	-	-	22.8	30
								E05	4.0	1	11.1	36.7	45
								E07	5.6	1	15.5	42.2	50
								E10	8.0	1	22.2	50.6	60
								E15	11.9	2	33.0	64.1	70
								E20	15.9	2	44.1	78.0	80
	230-3-60	12.8	95.0	20.0	1.6	5.2	0.0	None	-	-	-	22.8	30
								E05	5.3	1	12.7	38.7	45
								E07	7.5	1	18.0	45.4	50
								E10	10.6	1	25.5	54.7	60
								E15	15.9	2	38.2	70.6	80
								E20	21.2	2	51.0	86.5	90
	460-3-60	6.4	45.0	10.0	0.8	2.6	0.0	None	-	-	-	11.4	15
								E07	6.8	1	8.2	21.6	25
								E10	10.1	1	12.1	26.6	30
								E15	13.6	2	16.4	31.8	35
								E20	19.5	2	23.5	40.7	45
	575-3-60	5.4	38.0	8.5	0.6	2.0	0.0	None	-	-	-	9.2	15
								E10	10.6	1	10.2	22.0	25
								E15	15.9	1	15.3	28.4	30
								E20	21.2	2	20.4	34.7	35
048 (4.0)	208-1-60	21.1	113.0	33.0	2.3	7.6	0.0	None	-	-	-	36.3	45
								E05	4.0	1	19.2	60.3	70
								E07	5.6	1	26.9	69.9	80
								E10	8.0	1	38.5	84.4	90
								E15	11.9	2	57.2	107.8	110
								E20	15.9	2	76.4	131.8	150
	230-1-60	21.1	113.0	33.0	2.3	7.6	0.0	None	-	-	-	36.3	45
								E05	5.3	1	22.1	63.9	70
								E07	7.5	1	31.3	75.3	80
								E10	10.6	1	44.2	91.5	100
								E15	15.9	2	66.3	119.1	125
								E20	21.2	2	88.3	146.7	150
	208-3-60	16.0	120.0	25.0	2.3	5.2	0.0	None	-	-	-	27.5	35
								E05	4.0	1	11.1	41.4	50
								E07	5.6	1	15.5	46.9	50
								E10	8.0	1	22.2	55.3	60
								E15	11.9	2	33.0	68.8	70
								E20	15.9	2	44.1	82.7	90
	230-3-60	16.0	120.0	25.0	2.3	5.2	0.0	None	-	-	-	27.5	35
								E05	5.3	1	12.7	43.4	50
								E07	7.5	1	18.0	50.1	60
								E10	10.6	1	25.5	59.4	60
								E15	15.9	2	38.2	75.3	80
								E20	21.2	2	51.0	91.2	100
	460-3-60	8.3	60.0	13.0	1.3	2.6	0.0	None	-	-	-	14.3	20
								E07	6.8	1	8.2	24.5	30
								E10	10.1	1	12.1	29.5	30
								E15	13.6	2	16.4	34.7	35
								E20	19.5	2	23.5	43.6	45
	575-3-60	6.7	40.0	10.5	1.3	2.0	0.0	None	-	-	-	11.4	15
								E10	10.6	1	10.2	24.2	25
								E15	15.9	1	15.3	30.5	35
								E20	21.2	2	20.4	36.9	40

XP036-060 - Without Powered Convenience Outlet (Belt Drive) (Continued)

Size (Tons)	Volt	Compressors (each)			OD Fan Motors (each)	Supply Blower Motor	Pwr Conv Outlet	Electric Heat Option				MCA[1] (Amps)	Max Fuse[2]/ Breaker[3] Size (Amps)
		RLA	LRA	MCC	FLA	FLA	FLA	Model	kW	Stages	Amps		
060 (5.0)	208-1-60	26.2	134.0	41.0	2.3	7.6	0.0	None	-	-	-	42.7	60
								E05	4.0	1	19.2	66.7	80
								E07	5.6	1	26.9	76.3	90
								E10	8.0	1	38.5	90.7	100
								E15	11.9	2	57.2	114.2	125
								E20	15.9	2	76.4	138.2	150
								E30	22.2	2	106.7	176.1	200
	230-1-60	26.2	134.0	41.0	2.3	7.6	0.0	None	-	-	-	42.7	60
								E05	5.3	1	22.1	70.3	90
								E07	7.5	1	31.3	81.7	100
								E10	10.6	1	44.2	97.9	110
								E15	15.9	2	66.3	125.5	150
								E20	21.2	2	88.3	153.1	175
								E30	29.6	2	123.3	196.8	200
	208-3-60	15.6	110.0	24.4	2.3	5.2	0.0	None	-	-	-	27.0	35
								E05	4.0	1	11.1	40.9	50
								E07	5.6	1	15.5	46.4	50
								E10	8.0	1	22.2	54.8	60
								E15	11.9	2	33.0	68.3	70
								E20	15.9	2	44.1	82.2	90
								E30	22.2	2	61.6	104.0	110
	230-3-60	15.6	110.0	24.4	2.3	5.2	0.0	None	-	-	-	27.0	35
								E05	5.3	1	12.7	42.9	50
								E07	7.5	1	18.0	49.6	60
								E10	10.6	1	25.5	58.9	60
								E15	15.9	2	38.2	74.8	80
								E20	21.2	2	51.0	90.7	100
								E30	29.6	2	71.2	116.0	125
	460-3-60	7.7	52.0	12.1	1.3	2.6	0.0	None	-	-	-	13.5	20
								E07	6.8	1	8.2	23.7	25
								E10	10.1	1	12.1	28.7	30
								E15	13.6	2	16.4	34.0	35
								E20	19.5	2	23.5	42.8	45
								E30	28.8	2	34.6	56.8	60
	575-3-60	5.8	38.9	9.1	1.3	2.0	0.0	None	-	-	-	10.3	15
								E10	10.6	1	10.2	23.0	25
								E15	15.9	1	15.3	29.4	30
								E20	21.2	2	20.4	35.8	40
								E30	30.4	2	29.3	46.9	50

1. Minimum Circuit Ampacity.
2. Dual Element, Time Delay Type.
3. HACR type per NEC.

XP036-060 Without Powered Convenience Outlet (Belt Drive High Static)

Size (Tons)	Volt	Compressors (each)			OD Fan Motors (each)	Supply Blower Motor	Pwr Conv Outlet	Electric Heat Option				MCA[1] (Amps)	Max Fuse[2]/ Breaker[3] Size (Amps)
		RLA	LRA	MCC	FLA	FLA	FLA	Model	kW	Stages	Amps		
036 (3.0)	208-1-60	16.6	88.0	26.0	1.6	7.6	0.0	None	-	-	-	30.0	40
								E05	4.0	1	19.2	54.0	60
								E07	5.6	1	26.9	63.6	70
								E10	8.0	1	38.5	78.0	80
								E15	11.9	2	57.2	101.5	110
								E20	15.9	2	76.4	125.5	150
	230-1-60	16.6	88.0	26.0	1.6	7.6	0.0	None	-	-	-	30.0	40
								E05	5.3	1	22.1	57.6	60
								E07	7.5	1	31.3	69.0	70
								E10	10.6	1	44.2	85.2	90
								E15	15.9	2	66.3	112.8	125
								E20	21.2	2	88.3	140.4	150
	208-3-60	12.8	95.0	20.0	1.6	5.2	0.0	None	-	-	-	22.8	30
								E05	4.0	1	11.1	36.7	45
								E07	5.6	1	15.5	42.2	50
								E10	8.0	1	22.2	50.6	60
								E15	11.9	2	33.0	64.1	70
								E20	15.9	2	44.1	78.0	80
	230-3-60	12.8	95.0	20.0	1.6	5.2	0.0	None	-	-	-	22.8	30
								E05	5.3	1	12.7	38.7	45
								E07	7.5	1	18.0	45.4	50
								E10	10.6	1	25.5	54.7	60
								E15	15.9	2	38.2	70.6	80
								E20	21.2	2	51.0	86.5	90
	460-3-60	6.4	45.0	10.0	0.8	2.6	0.0	None	-	-	-	11.4	15
								E07	6.8	1	8.2	21.6	25
								E10	10.1	1	12.1	26.6	30
								E15	13.6	2	16.4	31.8	35
								E20	19.5	2	23.5	40.7	45
	575-3-60	5.4	38.0	8.5	0.6	2.0	0.0	None	-	-	-	9.2	15
								E10	10.6	1	10.2	22.0	25
								E15	15.9	1	15.3	28.4	30
								E20	21.2	2	20.4	34.7	35
048 (4.0)	208-1-60	21.1	113.0	33.0	2.3	7.6	0.0	None	-	-	-	36.3	45
								E05	4.0	1	19.2	60.3	70
								E07	5.6	1	26.9	69.9	80
								E10	8.0	1	38.5	84.4	90
								E15	11.9	2	57.2	107.8	110
								E20	15.9	2	76.4	131.8	150
	230-1-60	21.1	113.0	33.0	2.3	7.6	0.0	None	-	-	-	36.3	45
								E05	5.3	1	22.1	63.9	70
								E07	7.5	1	31.3	75.3	80
								E10	10.6	1	44.2	91.5	100
								E15	15.9	2	66.3	119.1	125
								E20	21.2	2	88.3	146.7	150
	208-3-60	16.0	120.0	25.0	2.3	5.2	0.0	None	-	-	-	27.5	35
								E05	4.0	1	11.1	41.4	50
								E07	5.6	1	15.5	46.9	50
								E10	8.0	1	22.2	55.3	60
								E15	11.9	2	33.0	68.8	70
								E20	15.9	2	44.1	82.7	90
	230-3-60	16.0	120.0	25.0	2.3	5.2	0.0	None	-	-	-	27.5	35
								E05	5.3	1	12.7	43.4	50
								E07	7.5	1	18.0	50.1	60
								E10	10.6	1	25.5	59.4	60
								E15	15.9	2	38.2	75.3	80
								E20	21.2	2	51.0	91.2	100
	460-3-60	8.3	60.0	13.0	1.3	2.6	0.0	None	-	-	-	14.3	20
								E07	6.8	1	8.2	24.5	30
								E10	10.1	1	12.1	29.5	30
								E15	13.6	2	16.4	34.7	35
								E20	19.5	2	23.5	43.6	45
	575-3-60	6.7	40.0	10.5	1.3	2.0	0.0	None	-	-	-	11.4	15
								E10	10.6	1	10.2	24.2	25
								E15	15.9	1	15.3	30.5	35
								E20	21.2	2	20.4	36.9	40

XP036-060 Without Powered Convenience Outlet (Belt Drive High Static) (Continued)

Size (Tons)	Volt	Compressors (each)			OD Fan Motors (each)	Supply Blower Motor	Pwr Conv Outlet	Electric Heat Option				MCA[1] (Amps)	Max Fuse[2]/ Breaker[3] Size (Amps)
		RLA	LRA	MCC	FLA	FLA	FLA	Model	kW	Stages	Amps		
060 (5.0)	208-3-60	15.6	110.0	24.4	2.3	8.2	0.0	None	-	-	-	30.0	40
								E05	4.0	1	11.1	43.9	50
								E07	5.6	1	15.5	49.4	60
								E10	8.0	1	22.2	57.8	60
								E15	11.9	2	33.0	71.3	80
								E20	15.9	2	44.1	85.2	90
								E30	22.2	2	61.6	107.0	110
	230-3-60	15.6	110.0	24.4	2.3	8.2	0.0	None	-	-	-	30.0	40
								E05	5.3	1	12.7	45.9	50
								E07	7.5	1	18.0	52.6	60
								E10	10.6	1	25.5	61.9	70
								E15	15.9	2	38.2	77.8	80
								E20	21.2	2	51.0	93.7	100
								E30	29.6	2	71.2	119.0	125
	460-3-60	7.7	52.0	12.1	1.3	4.1	0.0	None	-	-	-	15.0	20
								E07	6.8	1	8.2	25.2	30
								E10	10.1	1	12.1	30.2	35
								E15	13.6	2	16.4	35.5	40
								E20	19.5	2	23.5	44.3	45
								E30	28.8	2	34.6	58.3	60
	575-3-60	5.8	38.9	9.1	1.3	3.6	0.0	None	-	-	-	11.9	15
								E10	10.6	1	10.2	24.6	25
								E15	15.9	1	15.3	31.0	35
								E20	21.2	2	20.4	37.4	40
								E30	30.4	2	29.3	48.5	50

1. Minimum Circuit Ampacity.
2. Dual Element, Time Delay Type.
3. HACR type per NEC.

XP036-060 - Without Powered Convenience Outlet (Direct Drive)

Size (Tons)	Volt	Compressors (each)			OD Fan Motors (each)	Supply Blower Motor	Pwr Conv Outlet	Electric Heat Option				MCA[1] (Amps)	Max Fuse[2]/ Breaker[3] Size (Amps)
		RLA	LRA	MCC	FLA	FLA	FLA	Model	kW	Stages	Amps		
036 (3.0)	208-1-60	16.6	88.0	26.0	1.6	6.0	0.0	None	-	-	-	28.4	35
								E05	4.0	1	19.2	52.4	60
								E07	5.6	1	26.9	62.0	70
								E10	8.0	1	38.5	76.4	80
								E15	11.9	2	57.2	99.9	100
								E20	15.9	2	76.4	123.9	125
	230-1-60	16.6	88.0	26.0	1.6	6.0	0.0	None	-	-	-	28.4	35
								E05	5.3	1	22.1	56.0	60
								E07	7.5	1	31.3	67.4	70
								E10	10.6	1	44.2	83.6	90
								E15	15.9	2	66.3	111.2	125
								E20	21.2	2	88.3	138.8	150
	208-3-60	12.8	95.0	20.0	1.6	6.0	0.0	None	-	-	-	23.6	30
								E05	4.0	1	11.1	37.5	45
								E07	5.6	1	15.5	43.0	50
								E10	8.0	1	22.2	51.4	60
								E15	11.9	2	33.0	64.9	70
								E20	15.9	2	44.1	78.8	80
	230-3-60	12.8	95.0	20.0	1.6	6.0	0.0	None	-	-	-	23.6	30
								E05	5.3	1	12.7	39.5	45
								E07	7.5	1	18.0	46.2	50
								E10	10.6	1	25.5	55.5	60
								E15	15.9	2	38.2	71.4	80
								E20	21.2	2	51.0	87.3	90
048 (4.0)	208-1-60	21.1	113.0	33.0	2.3	7.6	0.0	None	-	-	-	36.3	45
								E05	4.0	1	19.2	60.3	70
								E07	5.6	1	26.9	69.9	80
								E10	8.0	1	38.5	84.4	90
								E15	11.9	2	57.2	107.8	110
								E20	15.9	2	76.4	131.8	150
	230-1-60	21.1	113.0	33.0	2.3	7.6	0.0	None	-	-	-	36.3	45
								E05	5.3	1	22.1	63.9	70
								E07	7.5	1	31.3	75.3	80
								E10	10.6	1	44.2	91.5	100
								E15	15.9	2	66.3	119.1	125
								E20	21.2	2	88.3	146.7	150
	208-3-60	16.0	120.0	25.0	2.3	7.6	0.0	None	-	-	-	29.9	40
								E05	4.0	1	11.1	43.8	50
								E07	5.6	1	15.5	49.3	60
								E10	8.0	1	22.2	57.7	60
								E15	11.9	2	33.0	71.2	80
								E20	15.9	2	44.1	85.1	90
	230-3-60	16.0	120.0	25.0	2.3	7.6	0.0	None	-	-	-	29.9	40
								E05	5.3	1	12.7	45.8	50
								E07	7.5	1	18.0	52.5	60
								E10	10.6	1	25.5	61.8	70
								E15	15.9	2	38.2	77.7	80
								E20	21.2	2	51.0	93.6	100

XP036-060 - Without Powered Convenience Outlet (Direct Drive) (Continued)

Size (Tons)	Volt	Compressors (each)			OD Fan Motors (each)	Supply Blower Motor	Pwr Conv Outlet	Electric Heat Option				MCA[1] (Amps)	Max Fuse[2]/ Breaker[3] Size (Amps)
		RLA	LRA	MCC	FLA	FLA	FLA	Model	kW	Stages	Amps		
060 (5.0)	208-1-60	26.2	134.0	41.0	2.3	7.6	0.0	None	-	-	-	42.7	60
								E05	4.0	1	19.2	66.7	80
								E07	5.6	1	26.9	76.3	90
								E10	8.0	1	38.5	90.7	100
								E15	11.9	2	57.2	114.2	125
								E20	15.9	2	76.4	138.2	150
								E30	22.2	2	106.7	176.1	200
	230-1-60	26.2	134.0	41.0	2.3	7.6	0.0	None	-	-	-	42.7	60
								E05	5.3	1	22.1	70.3	90
								E07	7.5	1	31.3	81.7	100
								E10	10.6	1	44.2	97.9	110
								E15	15.9	2	66.3	125.5	150
								E20	21.2	2	88.3	153.1	175
								E30	29.6	2	123.3	196.8	200
	208-3-60	15.6	110.0	24.4	2.3	7.6	0.0	None	-	-	-	29.4	40
								E05	4.0	1	11.1	43.3	50
								E07	5.6	1	15.5	48.8	60
								E10	8.0	1	22.2	57.2	60
								E15	11.9	2	33.0	70.7	80
								E20	15.9	2	44.1	84.6	90
								E30	22.2	2	61.6	106.4	110
	230-3-60	15.6	110.0	24.4	2.3	7.6	0.0	None	-	-	-	29.4	40
								E05	5.3	1	12.7	45.3	50
								E07	7.5	1	18.0	52.0	60
								E10	10.6	1	25.5	61.3	70
								E15	15.9	2	38.2	77.2	80
								E20	21.2	2	51.0	93.1	100
								E30	29.6	2	71.2	118.4	125

1. Minimum Circuit Ampacity.
2. Dual Element, Time Delay Type.
3. HACR type per NEC.

XP036-060 - With Powered Convenience Outlet (Belt Drive)

Size (Tons)	Volt	Compressors (each)			OD Fan Motors (each)	Supply Blower Motor	Pwr Conv Outlet	Electric Heat Option				MCA[1] (Amps)	Max Fuse[2]/ Breaker[3] Size (Amps)
		RLA	LRA	MCC	FLA	FLA	FLA	Model	kW	Stages	Amps		
036 (3.0)	208-1-60	16.6	88.0	26.0	1.6	7.6	10.0	None	-	-	-	40.0	50
								E05	4.0	1	19.2	64.0	70
								E07	5.6	1	26.9	73.6	80
								E10	8.0	1	38.5	88.0	90
								E15	11.9	2	57.2	111.5	125
								E20	15.9	2	76.4	135.5	150
	230-1-60	16.6	88.0	26.0	1.6	7.6	10.0	None	-	-	-	40.0	50
								E05	5.3	1	22.1	67.6	70
								E07	7.5	1	31.3	79.0	80
								E10	10.6	1	44.2	95.2	100
								E15	15.9	2	66.3	122.8	125
								E20	21.2	2	88.3	150.4	175
	208-3-60	12.8	95.0	20.0	1.6	5.2	10.0	None	-	-	-	32.8	40
								E05	4.0	1	11.1	46.7	50
								E07	5.6	1	15.5	52.2	60
								E10	8.0	1	22.2	60.6	70
								E15	11.9	2	33.0	74.1	80
								E20	15.9	2	44.1	88.0	90
	230-3-60	12.8	95.0	20.0	1.6	5.2	10.0	None	-	-	-	32.8	40
								E05	5.3	1	12.7	48.7	50
								E07	7.5	1	18.0	55.4	60
								E10	10.6	1	25.5	64.7	70
								E15	15.9	2	38.2	80.6	90
								E20	21.2	2	51.0	96.5	100
	460-3-60	6.4	45.0	10.0	0.8	2.6	5.0	None	-	-	-	16.4	20
								E07	6.8	1	8.2	26.6	30
								E10	10.1	1	12.1	31.6	35
								E15	13.6	2	16.4	36.8	40
								E20	19.5	2	23.5	45.7	50
	575-3-60	5.4	38.0	8.5	0.6	2.0	4.0	None	-	-	-	13.2	15
								E10	10.6	1	10.2	26.0	30
								E15	15.9	1	15.3	32.4	35
								E20	21.2	2	20.4	38.7	40
048 (4.0)	208-1-60	21.1	113.0	33.0	2.3	7.6	10.0	None	-	-	-	46.3	60
								E05	4.0	1	19.2	70.3	80
								E07	5.6	1	26.9	79.9	90
								E10	8.0	1	38.5	94.4	100
								E15	11.9	2	57.2	117.8	125
								E20	15.9	2	76.4	141.8	150
	230-1-60	21.1	113.0	33.0	2.3	7.6	10.0	None	-	-	-	46.3	60
								E05	5.3	1	22.1	73.9	80
								E07	7.5	1	31.3	85.3	90
								E10	10.6	1	44.2	101.5	110
								E15	15.9	2	66.3	129.1	150
								E20	21.2	2	88.3	156.7	175
	208-3-60	16.0	120.0	25.0	2.3	5.2	10.0	None	-	-	-	37.5	50
								E05	4.0	1	11.1	51.4	60
								E07	5.6	1	15.5	56.9	60
								E10	8.0	1	22.2	65.3	70
								E15	11.9	2	33.0	78.8	80
								E20	15.9	2	44.1	92.7	100
	230-3-60	16.0	120.0	25.0	2.3	5.2	10.0	None	-	-	-	37.5	50
								E05	5.3	1	12.7	53.4	60
								E07	7.5	1	18.0	60.1	70
								E10	10.6	1	25.5	69.4	70
								E15	15.9	2	38.2	85.3	90
								E20	21.2	2	51.0	101.2	110
	460-3-60	8.3	60.0	13.0	1.3	2.6	5.0	None	-	-	-	19.3	25
								E07	6.8	1	8.2	29.5	35
								E10	10.1	1	12.1	34.5	35
								E15	13.6	2	16.4	39.7	40
								E20	19.5	2	23.5	48.6	50
	575-3-60	6.7	40.0	10.5	1.3	2.0	4.0	None	-	-	-	15.4	20
								E10	10.6	1	10.2	28.2	30
								E15	15.9	1	15.3	34.5	35
								E20	21.2	2	20.4	40.9	45

XP036-060 - With Powered Convenience Outlet (Belt Drive) (Continued)

Size (Tons)	Volt	Compressors (each)			OD Fan Motors (each)	Supply Blower Motor	Pwr Conv Outlet	Electric Heat Option				MCA[1] (Amps)	Max Fuse[2]/ Breaker[3] Size (Amps)
		RLA	LRA	MCC	FLA	FLA	FLA	Model	kW	Stages	Amps		
060 (5.0)	208-1-60	26.2	134.0	41.0	2.3	7.6	10.0	None	-	-	-	52.7	70
								E05	4.0	1	19.2	76.7	90
								E07	5.6	1	26.9	86.3	100
								E10	8.0	1	38.5	100.7	110
								E15	11.9	2	57.2	124.2	125
								E20	15.9	2	76.4	148.2	150
								E30	22.2	2	106.7	186.1	200
	230-1-60	26.2	134.0	41.0	2.3	7.6	10.0	None	-	-	-	52.7	70
								E05	5.3	1	22.1	80.3	100
								E07	7.5	1	31.3	91.7	110
								E10	10.6	1	44.2	107.9	110
								E15	15.9	2	66.3	135.5	150
								E20	21.2	2	88.3	163.1	175
								E30	29.6	2	123.3	206.8	225
	208-3-60	15.6	110.0	24.4	2.3	5.2	10.0	None	-	-	-	37.0	45
								E05	4.0	1	11.1	50.9	60
								E07	5.6	1	15.5	56.4	60
								E10	8.0	1	22.2	64.8	70
								E15	11.9	2	33.0	78.3	80
								E20	15.9	2	44.1	92.2	100
								E30	22.2	2	61.6	114.0	125
	230-3-60	15.6	110.0	24.4	2.3	5.2	10.0	None	-	-	-	37.0	45
								E05	5.3	1	12.7	52.9	60
								E07	7.5	1	18.0	59.6	70
								E10	10.6	1	25.5	68.9	70
								E15	15.9	2	38.2	84.8	90
								E20	21.2	2	51.0	100.7	110
								E30	29.6	2	71.2	126.0	150
	460-3-60	7.7	52.0	12.1	1.3	2.6	5.0	None	-	-	-	18.5	25
								E07	6.8	1	8.2	28.7	30
								E10	10.1	1	12.1	33.7	35
								E15	13.6	2	16.4	39.0	40
								E20	19.5	2	23.5	47.8	50
								E30	28.8	2	34.6	61.8	70
	575-3-60	5.8	38.9	9.1	1.3	2.0	4.0	None	-	-	-	14.3	20
								E10	10.6	1	10.2	27.0	30
								E15	15.9	1	15.3	33.4	35
								E20	21.2	2	20.4	39.8	40
								E30	30.4	2	29.3	50.9	60

1. Minimum Circuit Ampacity.
2. Dual Element, Time Delay Type.
3. HACR type per NEC.

XP036-060 With Powered Convenience Outlet (Belt Drive High Static)

Size (Tons)	Volt	Compressors (each)			OD Fan Motors (each)	Supply Blower Motor	Pwr Conv Outlet	Electric Heat Option				MCA[1] (Amps)	Max Fuse[2]/ Breaker[3] Size (Amps)
		RLA	LRA	MCC	FLA	FLA	FLA	Model	kW	Stages	Amps		
036 (3.0)	208-1-60	16.6	88.0	26.0	1.6	7.6	10.0	None	-	-	-	40.0	50
								E05	4.0	1	19.2	64.0	70
								E07	5.6	1	26.9	73.6	80
								E10	8.0	1	38.5	88.0	90
								E15	11.9	2	57.2	111.5	125
								E20	15.9	2	76.4	135.5	150
	230-1-60	16.6	88.0	26.0	1.6	7.6	10.0	None	-	-	-	40.0	50
								E05	5.3	1	22.1	67.6	70
								E07	7.5	1	31.3	79.0	80
								E10	10.6	1	44.2	95.2	100
								E15	15.9	2	66.3	122.8	125
								E20	21.2	2	88.3	150.4	175
	208-3-60	12.8	95.0	20.0	1.6	5.2	10.0	None	-	-	-	32.8	40
								E05	4.0	1	11.1	46.7	50
								E07	5.6	1	15.5	52.2	60
								E10	8.0	1	22.2	60.6	70
								E15	11.9	2	33.0	74.1	80
								E20	15.9	2	44.1	88.0	90
	230-3-60	12.8	95.0	20.0	1.6	5.2	10.0	None	-	-	-	32.8	40
								E05	5.3	1	12.7	48.7	50
								E07	7.5	1	18.0	55.4	60
								E10	10.6	1	25.5	64.7	70
								E15	15.9	2	38.2	80.6	90
								E20	21.2	2	51.0	96.5	100
	460-3-60	6.4	45.0	10.0	0.8	2.6	5.0	None	-	-	-	16.4	20
								E07	6.8	1	8.2	26.6	30
								E10	10.1	1	12.1	31.6	35
								E15	13.6	2	16.4	36.8	40
								E20	19.5	2	23.5	45.7	50
	575-3-60	5.4	38.0	8.5	0.6	2.0	4.0	None	-	-	-	13.2	15
								E10	10.6	1	10.2	26.0	30
								E15	15.9	1	15.3	32.4	35
								E20	21.2	2	20.4	38.7	40
048 (4.0)	208-1-60	21.1	113.0	33.0	2.3	7.6	10.0	None	-	-	-	46.3	60
								E05	4.0	1	19.2	70.3	80
								E07	5.6	1	26.9	79.9	90
								E10	8.0	1	38.5	94.4	100
								E15	11.9	2	57.2	117.8	125
								E20	15.9	2	76.4	141.8	150
	230-1-60	21.1	113.0	33.0	2.3	7.6	10.0	None	-	-	-	46.3	60
								E05	5.3	1	22.1	73.9	80
								E07	7.5	1	31.3	85.3	90
								E10	10.6	1	44.2	101.5	110
								E15	15.9	2	66.3	129.1	150
								E20	21.2	2	88.3	156.7	175
	208-3-60	16.0	120.0	25.0	2.3	5.2	10.0	None	-	-	-	37.5	50
								E05	4.0	1	11.1	51.4	60
								E07	5.6	1	15.5	56.9	60
								E10	8.0	1	22.2	65.3	70
								E15	11.9	2	33.0	78.8	80
								E20	15.9	2	44.1	92.7	100
	230-3-60	16.0	120.0	25.0	2.3	5.2	10.0	None	-	-	-	37.5	50
								E05	5.3	1	12.7	53.4	60
								E07	7.5	1	18.0	60.1	70
								E10	10.6	1	25.5	69.4	70
								E15	15.9	2	38.2	85.3	90
								E20	21.2	2	51.0	101.2	110
	460-3-60	8.3	60.0	13.0	1.3	2.6	5.0	None	-	-	-	19.3	25
								E07	6.8	1	8.2	29.5	35
								E10	10.1	1	12.1	34.5	35
								E15	13.6	2	16.4	39.7	40
								E20	19.5	2	23.5	48.6	50
	575-3-60	6.7	40.0	10.5	1.3	2.0	4.0	None	-	-	-	15.4	20
								E10	10.6	1	10.2	28.2	30
								E15	15.9	1	15.3	34.5	35
								E20	21.2	2	20.4	40.9	45

XP036-060 With Powered Convenience Outlet (Belt Drive High Static) (Continued)

Size (Tons)	Volt	Compressors (each)			OD Fan Motors (each)	Supply Blower Motor	Pwr Conv Outlet	Electric Heat Option				MCA[1] (Amps)	Max Fuse[2]/ Breaker[3] Size (Amps)
		RLA	LRA	MCC	FLA	FLA	FLA	Model	kW	Stages	Amps		
060 (5.0)	208-3-60	15.6	110.0	24.4	2.3	8.2	10.0	None	-	-	-	40.0	50
								E05	4.0	1	11.1	53.9	60
								E07	5.6	1	15.5	59.4	70
								E10	8.0	1	22.2	67.8	70
								E15	11.9	2	33.0	81.3	90
								E20	15.9	2	44.1	95.2	100
								E30	22.2	2	61.6	117.0	125
	230-3-60	15.6	110.0	24.4	2.3	8.2	10.0	None	-	-	-	40.0	50
								E05	5.3	1	12.7	55.9	60
								E07	7.5	1	18.0	62.6	70
								E10	10.6	1	25.5	71.9	80
								E15	15.9	2	38.2	87.8	90
								E20	21.2	2	51.0	103.7	110
								E30	29.6	2	71.2	129.0	150
	460-3-60	7.7	52.0	12.1	1.3	4.1	5.0	None	-	-	-	20.0	25
								E07	6.8	1	8.2	30.2	35
								E10	10.1	1	12.1	35.2	40
								E15	13.6	2	16.4	40.5	45
								E20	19.5	2	23.5	49.3	50
								E30	28.8	2	34.6	63.3	70
	575-3-60	5.8	38.9	9.1	1.3	3.6	4.0	None	-	-	-	15.9	20
								E10	10.6	1	10.2	28.6	30
								E15	15.9	1	15.3	35.0	40
								E20	21.2	2	20.4	41.4	45
								E30	30.4	2	29.3	52.5	60

1. Minimum Circuit Ampacity.
2. Dual Element, Time Delay Type.
3. HACR type per NEC.

XP036-060 - With Powered Convenience Outlet (Direct Drive)

Size (Tons)	Volt	Compressors (each)			OD Fan Motors (each)	Supply Blower Motor	Pwr Conv Outlet	Electric Heat Option				MCA[1] (Amps)	Max Fuse[2]/ Breaker[3] Size (Amps)
		RLA	LRA	MCC	FLA	FLA	FLA	Model	kW	Stages	Amps		
036 (3.0)	208-1-60	16.6	88.0	26.0	1.6	6.0	10.0	None	-	-	-	38.4	50
								E05	4.0	1	19.2	62.4	70
								E07	5.6	1	26.9	72.0	80
								E10	8.0	1	38.5	86.4	90
								E15	11.9	2	57.2	109.9	110
								E20	15.9	2	76.4	133.9	150
	230-1-60	16.6	88.0	26.0	1.6	6.0	10.0	None	-	-	-	38.4	50
								E05	5.3	1	22.1	66.0	70
								E07	7.5	1	31.3	77.4	80
								E10	10.6	1	44.2	93.6	100
								E15	15.9	2	66.3	121.2	125
								E20	21.2	2	88.3	148.8	150
	208-3-60	12.8	95.0	20.0	1.6	6.0	10.0	None	-	-	-	33.6	45
								E05	4.0	1	11.1	47.5	50
								E07	5.6	1	15.5	53.0	60
								E10	8.0	1	22.2	61.4	70
								E15	11.9	2	33.0	74.9	80
								E20	15.9	2	44.1	88.8	90
	230-3-60	12.8	95.0	20.0	1.6	6.0	10.0	None	-	-	-	33.6	45
								E05	5.3	1	12.7	49.5	50
								E07	7.5	1	18.0	56.2	60
								E10	10.6	1	25.5	65.5	70
								E15	15.9	2	38.2	81.4	90
								E20	21.2	2	51.0	97.3	100
048 (4.0)	208-1-60	21.1	113.0	33.0	2.3	7.6	10.0	None	-	-	-	46.3	60
								E05	4.0	1	19.2	70.3	80
								E07	5.6	1	26.9	79.9	90
								E10	8.0	1	38.5	94.4	100
								E15	11.9	2	57.2	117.8	125
								E20	15.9	2	76.4	141.8	150
	230-1-60	21.1	113.0	33.0	2.3	7.6	10.0	None	-	-	-	46.3	60
								E05	5.3	1	22.1	73.9	80
								E07	7.5	1	31.3	85.3	90
								E10	10.6	1	44.2	101.5	110
								E15	15.9	2	66.3	129.1	150
								E20	21.2	2	88.3	156.7	175
	208-3-60	16.0	120.0	25.0	2.3	7.6	10.0	None	-	-	-	39.9	50
								E05	4.0	1	11.1	53.8	60
								E07	5.6	1	15.5	59.3	70
								E10	8.0	1	22.2	67.7	70
								E15	11.9	2	33.0	81.2	90
								E20	15.9	2	44.1	95.1	100
	230-3-60	16.0	120.0	25.0	2.3	7.6	10.0	None	-	-	-	39.9	50
								E05	5.3	1	12.7	55.8	60
								E07	7.5	1	18.0	62.5	70
								E10	10.6	1	25.5	71.8	80
								E15	15.9	2	38.2	87.7	90
								E20	21.2	2	51.0	103.6	110

XP036-060 - With Powered Convenience Outlet (Direct Drive) (Continued)

Size (Tons)	Volt	Compressors (each)			OD Fan Motors (each)	Supply Blower Motor	Pwr Conv Outlet	Electric Heat Option				MCA[1] (Amps)	Max Fuse[2]/ Breaker[3] Size (Amps)
		RLA	LRA	MCC	FLA	FLA	FLA	Model	kW	Stages	Amps		
060 (5.0)	208-1-60	26.2	134.0	41.0	2.3	7.6	10.0	None	-	-	-	52.7	70
								E05	4.0	1	19.2	76.7	90
								E07	5.6	1	26.9	86.3	100
								E10	8.0	1	38.5	100.7	110
								E15	11.9	2	57.2	124.2	125
								E20	15.9	2	76.4	148.2	150
								E30	22.2	2	106.7	186.1	200
	230-1-60	26.2	134.0	41.0	2.3	7.6	10.0	None	-	-	-	52.7	70
								E05	5.3	1	22.1	80.3	100
								E07	7.5	1	31.3	91.7	110
								E10	10.6	1	44.2	107.9	110
								E15	15.9	2	66.3	135.5	150
								E20	21.2	2	88.3	163.1	175
								E30	29.6	2	123.3	206.8	225
	208-3-60	15.6	110.0	24.4	2.3	7.6	10.0	None	-	-	-	39.4	50
								E05	4.0	1	11.1	53.3	60
								E07	5.6	1	15.5	58.8	70
								E10	8.0	1	22.2	67.2	70
								E15	11.9	2	33.0	80.7	90
								E20	15.9	2	44.1	94.6	100
								E30	22.2	2	61.6	116.4	125
	230-3-60	15.6	110.0	24.4	2.3	7.6	10.0	None	-	-	-	39.4	50
								E05	5.3	1	12.7	55.3	60
								E07	7.5	1	18.0	62.0	70
								E10	10.6	1	25.5	71.3	80
								E15	15.9	2	38.2	87.2	90
								E20	21.2	2	51.0	103.1	110
								E30	29.6	2	71.2	128.4	150

1. Minimum Circuit Ampacity.
2. Dual Element, Time Delay Type.
3. HACR type per NEC.

Table 8: XP036-060 Physical Data

Component	Models		
	XP036	XP048	XP060
Nominal Tonnage	**3.0**	**4.0**	**5.0**
ARI COOLING PERFORMANCE			
Gross Capacity @ ARI A point (Btu)	36200	48500	60100
ARI net capacity (Btu)	35000	46500	57500
EER	11.0	10.8	10.6
SEER	13.0	13.0	13.0
Nominal CFM	1200	1600	1850
System power (KW)	3.25	4.26	5.42
Refrigerant type	R-410A	R-410A	R-410A
Refrigerant charge (lb-oz)	13-0	13-0	12-10
ARI HEATING PERFORMANCE			
47°F capacity rating (MBH)	34800	45000	56500
System power (KW) / COP	3.29 (kW) / 3.10	4.06 (kW) / 3.25	5.4 (kW) / 3.10
17°F capacity rating (MBH	19000	27000	34400
System power (KW) / COP	2.60 (kW) / 2.15	3.86 (kW) / 2.06	4.75 (kW) / 2.10
HSPF (Btu/Watts-hr)	7.70	7.70	7.70
DIMENSIONS (inches)			
Length	82-1/4	82-1/4	82-1/4
Width	44-7/8	44-7/8	44-7/8
Height	32-5/8	32-5/8	32-5/8
OPERATING WT. (lbs.)	575	585	590
COMPRESSORS			
Type	Scroll	Scroll	Scroll
Quantity	1	1	1
CONDENSER COIL DATA			
Face area (Sq. Ft.)	16.88	16.88	16.88
Rows	2	2	2
Fins per inch	18	18	18
Tube diameter	3/8	3/8	3/8
Circuitry Type	Split-face	Split-face	Split-face
EVAPORATOR COIL DATA			
Face area (Sq. Ft.)	5.06	5.06	5.06
Rows	4	4	4
Fins per inch	13	13	13
Tube diameter	0.375	0.375	0.375
Circuitry Type	Split-face	Split-face	Split-face
Refrigerant control	TXV	TXV	TXV

Table 8: XP036-060 Physical Data (Continued)

Component	Models					
	XP036		XP048		XP060	
Nominal Tonnage	**3.0**		**4.0**		**5.0**	
CONDENSER FAN DATA						
Quantity	1		1		1	
Fan diameter (Inch)	24		24		24	
Type	Prop		Prop		Prop	
Drive type	Direct Drive		Direct Drive		Direct Drive	
No. speeds	1		1		1	
Number of motors	1		1		1	
Motor HP each	1/4		1/2		1/2	
RPM	850		1090		1090	
Nominal total CFM	3275		4200		4200	
BELT DRIVE EVAP FAN DATA						
Quantity	1		1		1	
Fan Size (Inch)	12 x 10		12 x 10		12 x 10	
Type	Centrifugal		Centrifugal		Centrifugal	
Motor Sheave	1VL44	1VP56	1VL44	1VP56	1VL44	1VP56
Blower Sheave	AK64	AK66	AK56	AK61	AK56	AK56
Belt	A37	A39	A36	A38	A36	A38
Motor HP each	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2
RPM	1725		1725		1725	
Frame size	56		56		56	
DIRECT DRIVE EVAP FAN DATA						
Quantity	1		1		1	
Fan Size (Inch)	12 x 10		12 x 10		12 x 10	
Type	Centrifugal		Centrifugal		Centrifugal	
Motor HP each	3/4		1		1	
RPM	1050		1050		1050	
FILTERS						
15” x 20” x 1” or 2”	2		2		2	
14” x 25” x 1” or 2”	1		1		1	

Optional Electric Heat

The factory or field installed heaters are wired for single point power supply. Power supply need only be brought into the single point terminal block, and thermostat wiring to the low voltage terminal strip located in the upper portion of the unit control box.

These CSA approved heaters are located within the central compartment of the unit with the heater elements extending in to the supply air chamber.

Fuses are supplied, where required, by the factory. Some kW sizes require fuses and others do not. refer to Table 9 for minimum CFM limitations and to Table 7 for electrical data.

Table 9: Electric Heat Minimum Supply Air

Size (Tons)	Voltage	Minimum Supply Air (CFM)					
		Heater kW					
		5	7	10	15	20	30
036 (3.0)	208/230-1-60	900	900	900	900	900	-
	208/230-3-60	900	900	900	900	900	-
	460-3-60	-	900	900	900	900	-
	600-3-60	-	-	900	900	900	-
048 (4.0)	208/230-1-60	1200	1200	1200	1200	1200	-
	208/230-3-60	1200	1200	1200	1200	1200	-
	460-3-60	-	1200	1200	1200	1200	-
	600-3-60	-	-	1200	1200	1200	-
060 (5.0)	208/230-1-60	1500	1500	1500	1500	1500	1500
	208/230-3-60	1500	1500	1500	1500	1500	1500
	460-3-60	-	1500	1500	1500	1500	1500
	600-3-60	-	-	1500	1500	1500	1500

Options/Accessories

Economizer/Motorized Damper and Rain Hood

The instruction for the optional economizer/motorized damper and rain hood can be found in form 035-07364-000. Use these instructions when field assembling an economizer rain hood onto a unit. The outdoor and return air dampers, the damper actuator, the damper linkage, the outdoor and return air divider baffles, and all the control sensors are factory mounted as part of the “Factory installed” economizer/motorized damper options.

Power Exhaust/barometric Relief Damper and Rain Hood

The instructions for the power exhaust/barometric relief damper and rain hood can be found in form 530.18-N1.10V.

All of the components, including the dampers, hardware, and mounting instructions are shipped in a single package external from the unit and must be field assembled and installed.

Power exhaust is only available as a field installed accessory.

Economizer And Power Exhaust Set Point Adjustments

Remove the top rear access panel from the unit. Locate the economizer control module, where the following adjustments will be made.

⚠ CAUTION

Extreme care must be exercised in turning all set point, maximum and minimum damper positioning adjustment screws to prevent twisting them off.

Minimum Position Adjustment

- Check that the damper blades move smoothly without binding; carefully turn the Minimum Position Adjust screw (found on the damper control module) fully clockwise and then set the thermostat indoor fan switch to the ON position and then OFF or energize and de-energize terminals “R” to “G”.
- With the thermostat set to the indoor fan ON position or terminals “R” to “G” energized, turn the Minimum Position Adjusting screw (located on the damper control module) counterclockwise until the desired minimum damper position has been attained.

Enthalpy Set Point Adjustment

- The enthalpy set point may now be set by selecting the desired set point shown in the Enthalpy Set Point Adjustment Figure 13. Adjust as follows:
- For a single enthalpy operation carefully turn the set point adjusting screw (found on the damper control module) to the “A”, “B”, “C” or “D” setting corresponding to the lettered curve of the Enthalpy Set Point Adjustment Figure 14.
- For a dual enthalpy operation, carefully turn the set point adjusting screw fully clockwise past the "D" setting.

Power Exhaust Damper Set Point (With Or Without Power Exhaust)

- With no power exhaust option, adjust the Exhaust Air Adjustment Screw fully clockwise.
- With power exhaust option, each building pressurization requirement will be different. The point at which the power exhaust comes on is determined by the economizer damper position (Percent Open). The Exhaust Air Adjustment Screw should be set at the Percent Open of the economizer damper at which the power exhaust is needed. It can be set from 0 to 100% damper open.

Indoor Air Quality AQ

Indoor Air Quality (indoor sensor input): Terminal AQ accepts a +2 to +10 Vdc signal with respect to the (AQ1) terminal. When the signal is below it's set point, the actuator is allowed to modulate normally in accordance with the enthalpy and mixed air sensor inputs. When the AQ signal exceeds it's set point setting and there is no call for free cooling, the actuator is proportionately modulated from the 2 to 10 Vdc signal, with 2 Vdc corresponding to full closed and 10 Vdc corresponding to full open. When there is no call for free cooling, the damper position is limited by the IAQ Max damper position setting. When the signal exceeds it's set point (Demand Control Ventilation Set Point) setting and there is a call for free cooling, the actuator modulates from the minimum position to the full open position based on the highest call from either the mixed air sensor input or the AQ voltage input.

- Optional CO_2 Space Sensor Kit Part # 2AQ04700324
- Optional CO_2 Sensor Kit Part # 2AQ04700424

Replace the economizer access panel.

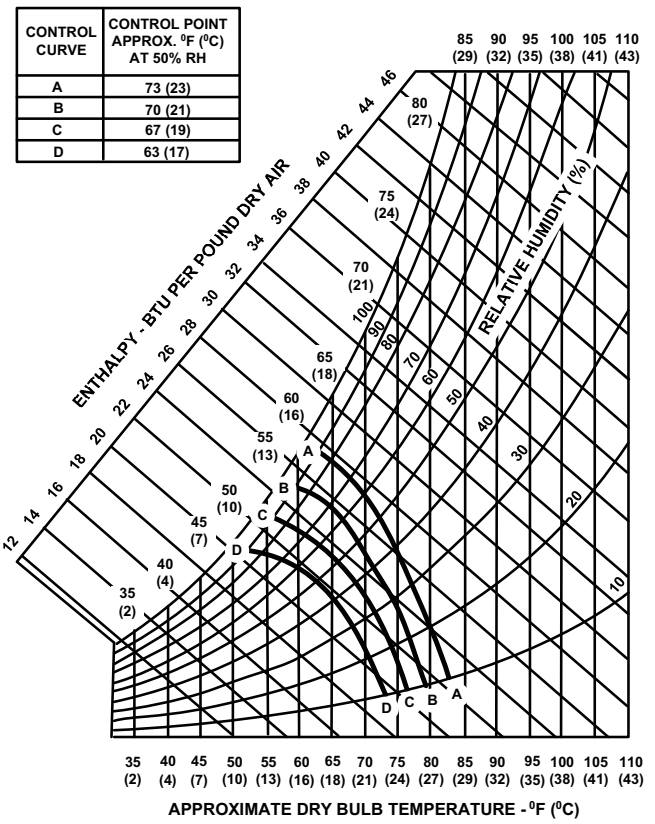


Figure 13: Enthalpy Set Point Chart

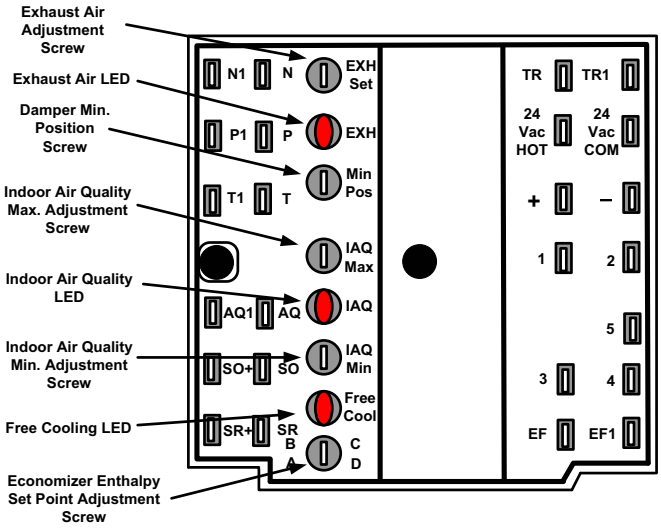


Figure 14: Honeywell Economizer Control W7212

Phasing

XP units are properly phased at the factory. Check for proper compressor rotation. If the blower or compressors rotate in the wrong direction at start-up, the electrical connection to the unit is misphased. Change the phasing of the **Field Line Connection at the factory or field supplied disconnect** to obtain proper rotation. (Scroll compressors operate in only one direction. If the scroll is drawing low amperage, has similar suction and discharge pressures, or producing a high noise level, the scroll is misphased.)

⚠ CAUTION

Scroll compressors require proper rotation to operate correctly. Units are properly phased at the factory. Do not change the internal wiring to make the blower condenser fans, or compressor rotate correctly.

Blower Rotation

Check for proper supply air blower rotation. If the blower is rotating backwards, the line voltage at the unit point of power connection is misphased (See 'PHASING').

Belt Tension

The tension on the belt should be adjusted as shown in Figure 15.

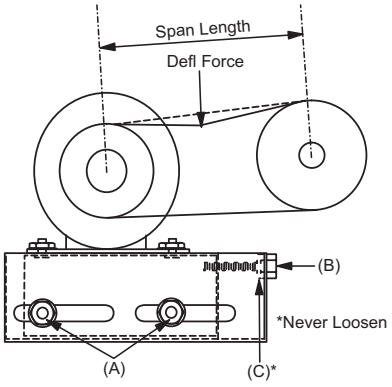


Figure 15: Belt Adjustment

⚠ CAUTION

Procedure for adjusting belt tension:

1. Loosen six nuts (top and bottom) A.
2. Adjust by turning (B).
3. Never loosen nuts (C).
4. Use belt tension checker to apply a perpendicular force to one belt at the midpoint of the span as shown. Deflection distance of 4mm (5/32") is obtained.

To determine the deflection distance from normal position, use a straight edge from sheave to sheave as reference line. The recommended deflection force is as follows:

Tension new belts at the max. deflection force recommended for the belt section. Check the belt tension at least two times during the first 24 hours of operation. Any retensioning should fall between the min. and max. deflection force values.

5. After adjusting retighten nuts (A).

CFM Static Pressure and Power-Altitude and Temperature Corrections

The information below should be used to assist in application of product when being applied at altitudes at or exceeding 1000 feet above sea level.

The air flow rates listed in the standard blower performance tables are based on standard air at sea level. As the altitude or temperature increases, the density of air decreases. In order to use the indoor blower tables for high altitude applications, certain corrections are necessary.

A centrifugal fan is a "constant volume" device. This means that, if the rpm remains constant, the CFM delivered is the same regardless of the density of the air. However, since the air at high altitude is less dense, less static pressure will be generated and less power will be required than a similar application at sea level. Air density correction factors are shown in Table 10 and Figure 16.

Table 10: Altitude/Temperature Correction Factors

Air Temp.	Altitude (Ft.)										
	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
40	1.060	1.022	0.986	0.950	0.916	0.882	0.849	0.818	0.788	0.758	0.729
50	1.039	1.002	0.966	0.931	0.898	0.864	0.832	0.802	0.772	0.743	0.715
60	1.019	0.982	0.948	0.913	0.880	0.848	0.816	0.787	0.757	0.729	0.701
70	1.000	0.964	0.930	0.896	0.864	0.832	0.801	0.772	0.743	0.715	0.688
80	0.982	0.947	0.913	0.880	0.848	0.817	0.787	0.758	0.730	0.702	0.676
90	0.964	0.929	0.897	0.864	0.833	0.802	0.772	0.744	0.716	0.689	0.663
100	0.946	0.912	0.880	0.848	0.817	0.787	0.758	0.730	0.703	0.676	0.651

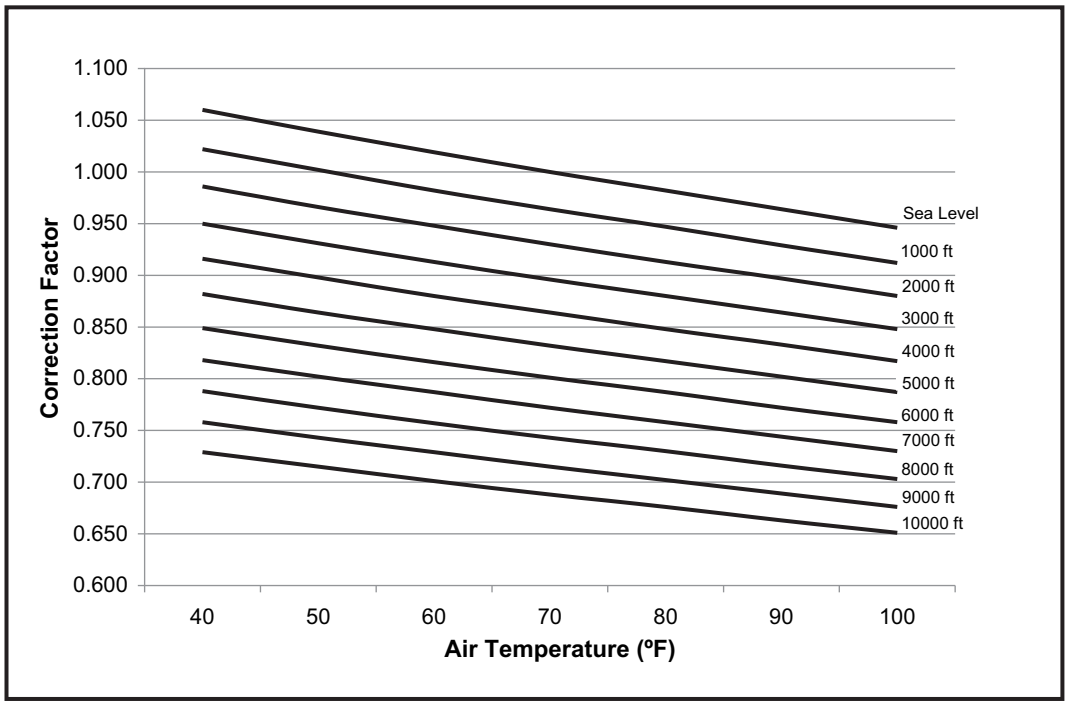


Figure 16: Altitude/Temperature Correction Factors

The examples below will assist in determining the airflow performance of the product at altitude.

Example 1: What are the corrected CFM, static pressure, and BHP at an elevation of 5,000 ft. if the blower performance data is 1,400 CFM, 0.6 IWC and 0.67 BHP?

Solution: At an elevation of 5,000 ft. the indoor blower will still deliver 1,400 CFM if the rpm is unchanged. However, Table 11 must be used to determine the static pressure and BHP. Since no temperature data is given, we will assume an air temperature of 70°F. Table 10 shows the correction factor to be 0.832.

Corrected static pressure = 0.6 x 0.832 = 0.499 IWC

Corrected BHP = 0.67 x 0.832 = 0.56

Example 2: A system, located at 5,000 feet of elevation, is to deliver 1,400 CFM at a static pressure of 1.5". Use the unit blower tables to select the blower speed and the BHP requirement.

Solution: As in the example above, no temperature information is given so 70°F is assumed.

The 1.5" static pressure given is at an elevation of 5,000 ft. The first step is to convert this static pressure to equivalent sea level conditions.

Sea level static pressure = 0.6 / .832 = 0.72"

Enter the blower table at 1,400 sCFM and static pressure of 0.72". The rpm listed will be the same rpm needed at 5,000 ft.

Suppose that the corresponding BHP listed in the table is 0.7. This value must be corrected for elevation.

BHP at 5,000 ft. = 0.7 x .832 = 0.58

Drive Selection

1. Determine side or bottom supply air duct application.
2. Determine desired airflow.
3. Calculate or measure the amount of external static pressure.
4. Using the operating point determined from steps 1, 2 & 3, locate this point on the appropriate supply air blower performance table. (Linear interpolation may be necessary.)
5. Noting the RPM and BHP from step 4, locate the appropriate motor and/or drive on the RPM selection table.
6. Review the BHP compared to the motor options available. Select the appropriate motor and/or drive.
7. Review the RPM range for the motor options available. Select the appropriate drive if multiple drives are available for the chosen motor.
8. Determine turns open to obtain the desired operation point.

Example

1. 2200 CFM
2. 1.6 iwg
3. Using the supply air blower performance table below, the following data point was located: 1478 RPM & 1.82 BHP.
4. Using the RPM selection table below, Size X and Model Y is found.
5. 1.82 BHP exceeds the maximum continuous BHP rating of the 1.5 HP motor. The 2 HP motor is required.
6. 1478 RPM is within the range of the 2 HP drive.
7. Using the 2 HP motor and drive, 2.5 turns open will achieve 1478 RPM.

Example Supply Air Blower Performance

Air Flow (CFM)	Available External Static Pressure - IWG																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Field Supplied Drive		Standard Drive Option								HIgh Static Drive Option									
2000	907	1.00	990	1.07	1070	1.15	1146	1.23	1220	1.31	1291	1.40	1359	1.49	1425	1.58	1488	1.68	1550	1.77
2200	960	1.24	1043	1.31	1123	1.39	1199	1.47	1273	1.55	1344	1.64	1412	1.73	1478	1.82	1541	1.92	1602	2.01
2400	1015	1.51	1099	1.59	1178	1.66	1255	1.74	1329	1.83	1400	1.92	1468	2.01	1534	2.10	1597	2.19	1658	2.29
2600	1074	1.83	1157	1.90	1237	1.98	1314	2.06	1387	2.14	1458	2.23	-	-	-	-	-	-	-	-

Table X: RPM Selection

Size (Tons)	Model	HP	Max BHP	Motor Sheave	Blower Sheave	5 Turns Open	4 Turns Open	3 Turns Open	2 Turns Open	1 Turn Open	Fully Closed
X	Y	1.5	1.73	1VL44	AK56	930	995	1060	1130	1195	1260
		2	2.3	1VP56	AK56	1325	1395	1460	1525	1590	1660

Table 11: XP Blower Performance Side Duct

XP036 (3 Ton Belt Drive) Side Duct

Air Flow (CFM)	Available External Static Pressure - IWG[1]																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Field Supplied Drive				Standard Drive Option								HIgh Static Drive Option							
800	678	0.37	761	0.44	840	0.52	917	0.60	991	0.69	1062	0.77	1130	0.87	1195	0.96	1259	1.06	1320	1.17
1000	699	0.42	782	0.49	862	0.56	939	0.64	1012	0.73	1083	0.82	1151	0.91	1217	1.01	1280	1.11	1341	1.21
1200	727	0.45	810	0.52	889	0.60	966	0.68	1040	0.76	1110	0.85	1179	0.95	1244	1.04	1308	1.14	1369	1.24
1400	759	0.51	842	0.58	922	0.65	998	0.73	1072	0.82	1143	0.91	1211	1.00	1276	1.10	1340	1.20	1401	1.30
1600	795	0.60	878	0.67	958	0.74	1035	0.82	1108	0.91	1179	1.00	1247	1.09	1313	1.19	1376	1.28	1438	1.39
																			FS[4]	

1. Blower performance includes 1" filters. See STATIC RESISTANCE table for additional applications.
2. See RPM SELECTION table to determine desired motor sheave setting and to determine the maximum continuous BHP.
3. kW = BHP x 0.932.
4. Field Supplied Drive.

XP048 (4 Ton Belt Drive) Side Duct

Air Flow (CFM)	Available External Static Pressure - IWG[1]																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Field Supplied Drive						Standard Drive Option										HIgh Static Drive Option			
1000	699	0.42	782	0.49	862	0.56	939	0.64	1012	0.73	1083	0.82	1151	0.91	1217	1.01	1280	1.11	1341	1.21
1200	727	0.45	810	0.52	889	0.60	966	0.68	1040	0.76	1110	0.85	1179	0.95	1244	1.04	1308	1.14	1369	1.24
1400	759	0.51	842	0.58	922	0.65	998	0.73	1072	0.82	1143	0.91	1211	1.00	1276	1.10	1340	1.20	1401	1.30
1600	795	0.60	878	0.67	958	0.74	1035	0.82	1108	0.91	1179	1.00	1247	1.09	1313	1.19	1376	1.28	1438	1.39
1800	836	0.72	919	0.79	999	0.87	1075	0.95	1149	1.03	1220	1.12	1288	1.22	1353	1.31	1417	1.41	1478	1.51
2000	880	0.89	963	0.96	1042	1.04	1119	1.12	1193	1.20	1263	1.29	1331	1.39	1397	1.48	1460	1.58	1522	1.68

1. Blower performance includes 1" filters. See STATIC RESISTANCE table for additional applications.
2. See RPM SELECTION table to determine desired motor sheave setting and to determine the maximum continuous BHP.
3. kW = BHP x 0.932.

XP060 (5 Ton Belt Drive) Side Duct

Air Flow (CFM)	Available External Static Pressure - IWG[1]																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Field Supplied Drive						Standard Drive Option										HIgh Static Drive Option			
1200	727	0.45	810	0.52	889	0.60	966	0.68	1040	0.76	1110	0.85	1179	0.95	1244	1.04	1308	1.14	1369	1.24
1400	759	0.51	842	0.58	922	0.65	998	0.73	1072	0.82	1143	0.91	1211	1.00	1276	1.10	1340	1.20	1401	1.30
1600	795	0.60	878	0.67	958	0.74	1035	0.82	1108	0.91	1179	1.00	1247	1.09	1313	1.19	1376	1.28	1438	1.39
1800	836	0.72	919	0.79	999	0.87	1075	0.95	1149	1.03	1220	1.12	1288	1.22	1353	1.31	1417	1.41	1478	1.51
2000	880	0.89	963	0.96	1042	1.04	1119	1.12	1193	1.20	1263	1.29	1331	1.39	1397	1.48	1460	1.58	1522	1.68
2200	926	1.10	1009	1.17	1089	1.25	1166	1.33	1239	1.41	1310	1.50	1378	1.60	1444	1.69	1507	1.79	1568	1.89
2400	976	1.35	1059	1.42	1138	1.50	1215	1.58	1289	1.66	1359	1.75	1428	1.85	1493	1.94	1557	2.04	1618	2.14
2600	1028	1.64	1111	1.71	1190	1.78	1267	1.87	1340	1.95	1411	2.04	1479	2.13	1545	2.23	1608	2.33	-	-

1. Blower performance includes 1" filters. See STATIC RESISTANCE table for additional applications.
2. See RPM SELECTION table to determine desired motor sheave setting and to determine the maximum continuous BHP.
3. kW = BHP x 0.932.

XP036 - 060 (3-5 Ton Direct Drive) Side Duct

UNIT TONNAGE	MOTOR[1] SPEED	AVAILABLE EXTERNAL STATIC PRESSURE - IWG[2]																	
		0.2		0.3		0.4		0.5		0.6		0.7		0.8		0.9		1.0	
		CFM	WATTS	CFM	WATTS	CFM	WATTS	CFM	WATTS	CFM	WATTS	CFM	WATTS	CFM	WATTS	CFM	WATTS	CFM	WATTS
3[3]	5 (HI)	1528	320	1485	335	1445	349	1409	363	1370	376	1334	390	1292	403	1254	417	1213	430
	4 (MED/HI)	1437	263	1391	276	1349	290	1308	303	1265	316	1220	329	1173	343	1119	358	1048	374
	3 (MED)	1293	208	1248	221	1205	234	1160	246	1113	258	1065	272	1001	288	934	303	892	313
	2 (MED/LOW)	1191	171	1144	183	1096	195	1045	207	991	220	925	235	865	248	-	-	-	-
	1 (LOW)	1044	130	963	134	903	145	833	158	-	-	-	-	-	-	-	-	-	-
4[3]	5 (HI)	-	-	2007	696	1968	714	1933	734	1896	749	1855	764	1806	769	1719	743	1574	685
	4 (MED/HI)	1857	539	1822	557	1786	571	1746	585	1713	602	1671	619	1628	638	1574	653	1500	639
	3 (MED)	1672	408	1633	426	1586	438	1550	455	1509	472	1462	490	1408	505	1363	521	1330	536
	2 (MED/LOW)	1574	362	1534	380	1487	391	1458	406	1418	423	1370	440	1319	455	1285	469	1241	485
	1 (LOW)	1293	223	1252	237	1196	247	-	-	-	-	-	-	-	-	-	-	-	-
5[3]	5 (HI)	2245	883	2247	931	2236	950	2211	964	2171	979	2114	971	2034	940	1948	898	1855	854
	4 (MED/HI)	2135	771	2116	784	2108	808	2078	826	2041	844	2004	859	1955	861	1886	843	1792	806
	3 (MED)	2010	637	1989	656	1975	675	1938	696	1900	715	1867	730	1822	740	1784	756	1716	748
	2 (MED/LOW)	1748	413	1704	432	1669	451	1631	468	1589	479	1551	497	1513	513	1465	523	-	-
	1 (LOW)	1562	327	1529	339	1491	356	-	-	-	-	-	-	-	-	-	-	-	-

1. Factory set on medium speed tap.
2. Includes allowances for a wet evaporator coil and 1" filters. Refer to STATIC RESISTANCES Table for resistance values.
3. Side Duct application (230 Volts)

Table 12: XP Blower Performance Bottom Duct

XP036 (3 Ton Belt Drive) Bottom Duct

Air Flow (CFM)	Available External Static Pressure - IWG[1]																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Field Supplied Drive				Standard Drive Option								HIgh Static Drive Option							
800	661	0.39	751	0.45	838	0.53	922	0.61	1002	0.69	1079	0.78	1153	0.87	1225	0.96	1294	1.06	1361	1.16
1000	685	0.43	775	0.50	862	0.57	945	0.65	1025	0.73	1103	0.82	1177	0.91	1248	1.00	1317	1.10	1384	1.20
1200	714	0.46	805	0.53	892	0.60	975	0.68	1055	0.76	1132	0.85	1207	0.94	1278	1.04	1347	1.13	1414	1.23
1400	749	0.52	840	0.58	927	0.66	1010	0.74	1090	0.82	1167	0.91	1242	1.00	1313	1.09	1382	1.19	1449	1.29
1600	789	0.60	880	0.67	967	0.74	1050	0.82	1130	0.91	1207	0.99	1282	1.08	1353	1.18	1422	1.27	1489	1.37
																	Field Supplied Drive			

1. Blower performance includes 1" filters. See STATIC RESISTANCE table for additional applications.
2. See RPM SELECTION table to determine desired motor sheave setting and to determine the maximum continuous BHP.
3. kW = BHP x 0.932.

XP048 (4 Ton Belt Drive) Bottom Duct

Air Flow (CFM)	Available External Static Pressure - IWG[1]																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Field Supplied Drive						Standard Drive Option										HIgh Static Drive Option			
1000	685	0.43	775	0.50	862	0.57	945	0.65	1025	0.73	1103	0.82	1177	0.91	1248	1.00	1317	1.10	1384	1.20
1200	714	0.46	805	0.53	892	0.60	975	0.68	1055	0.76	1132	0.85	1207	0.94	1278	1.04	1347	1.13	1414	1.23
1400	749	0.52	840	0.58	927	0.66	1010	0.74	1090	0.82	1167	0.91	1242	1.00	1313	1.09	1382	1.19	1449	1.29
1600	789	0.60	880	0.67	967	0.74	1050	0.82	1130	0.91	1207	0.99	1282	1.08	1353	1.18	1422	1.27	1489	1.37
1800	833	0.73	924	0.80	1011	0.87	1094	0.95	1174	1.03	1251	1.12	1326	1.21	1397	1.30	1466	1.40	1533	1.50
2000	881	0.89	971	0.96	1058	1.03	1142	1.11	1222	1.20	1299	1.28	1373	1.37	1445	1.47	1514	1.57	1580	1.66
																			FS[4]	

1. Blower performance includes 1" filters. See STATIC RESISTANCE table for additional applications.
2. See RPM SELECTION table to determine desired motor sheave setting and to determine the maximum continuous BHP.
3. kW = BHP x 0.932.
4. Field Supplied Drive.

XP060 (5 Ton Belt Drive) Bottom Duct

Air Flow (CFM)	Available External Static Pressure - IWG[1]																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Field Supplied Drive						Standard Drive Option								HIgh Static Drive Option					
1200	714	0.46	805	0.53	892	0.60	975	0.68	1055	0.76	1132	0.85	1207	0.94	1278	1.04	1347	1.13	1414	1.23
1400	749	0.52	840	0.58	927	0.66	1010	0.74	1090	0.82	1167	0.91	1242	1.00	1313	1.09	1382	1.19	1449	1.29
1600	789	0.60	880	0.67	967	0.74	1050	0.82	1130	0.91	1207	0.99	1282	1.08	1353	1.18	1422	1.27	1489	1.37
1800	833	0.73	924	0.80	1011	0.87	1094	0.95	1174	1.03	1251	1.12	1326	1.21	1397	1.30	1466	1.40	1533	1.50
2000	881	0.89	971	0.96	1058	1.03	1142	1.11	1222	1.20	1299	1.28	1373	1.37	1445	1.47	1514	1.57	1580	1.66
2200	932	1.10	1022	1.17	1109	1.24	1193	1.32	1273	1.40	1350	1.49	1424	1.58	1496	1.67	1565	1.77	1631	1.87
2400	986	1.34	1076	1.41	1163	1.48	1246	1.56	1327	1.64	1404	1.73	1478	1.82	1550	1.92	1619	2.01	1685	2.11
2600	1042	1.62	1132	1.69	1219	1.76	1303	1.84	1383	1.92	1460	2.01	1534	2.10	1606	2.20	1675	2.29	-	-
																	Field Supplied Drive			

1. Blower performance includes 1" filters. See STATIC RESISTANCE table for additional applications.
2. See RPM SELECTION table to determine desired motor sheave setting and to determine the maximum continuous BHP.
3. kW = BHP x 0.932.

XP036 - 060 (3-5 Ton Direct Drive) Bottom Duct

UNIT TONNAGE	MOTOR[1] SPEED	AVAILABLE EXTERNAL STATIC PRESSURE - IWG[2]																	
		0.2		0.3		0.4		0.5		0.6		0.7		0.8		0.9		1.0	
		CFM	WATTS	CFM	WATTS	CFM	WATTS	CFM	WATTS	CFM	WATTS	CFM	WATTS	CFM	WATTS	CFM	WATTS	CFM	WATTS
3^3	5 (HI)	1476	320	1435	335	1396	349	1361	363	1324	376	1289	390	1249	403	1212	417	1172	430
	4 (MED/HI)	1388	263	1344	276	1303	290	1264	303	1222	316	1179	329	1134	343	1082	358	1013	374
	3 (MED)	1250	208	1206	221	1164	234	1121	246	1076	258	1029	272	968	288	903	303	863	313
	2 (MED/LOW)	1151	171	1105	183	1060	195	1010	207	958	220	895	235	-	-	-	-	-	-
	1 (LOW)	1009	130	932	134	874	145	-	-	-	-	-	-	-	-	-	-	-	-
4^3	5 (HI)	1975	636	1937	696	1900	714	1866	734	1831	749	1791	764	1743	769	1660	743	1520	685
	4 (MED/HI)	1793	539	1759	557	1724	571	1685	585	1654	602	1613	619	1572	638	1520	653	1449	639
	3 (MED)	1614	408	1577	426	1532	438	1497	455	1458	472	1412	490	1360	505	1317	521	1285	536
	2 (MED/LOW)	1520	362	1481	380	1437	391	1408	406	1370	423	1324	440	1274	455	1242	469	1199	485
	1 (LOW)	1250	223	1210	237	1156	247	-	-	-	-	-	-	-	-	-	-	-	-
5^3	5 (HI)	2166	883	2169	931	2158	950	2134	964	2095	979	2040	971	1963	940	1881	898	1791	854
	4 (MED/HI)	2060	771	2042	784	2035	808	2006	826	1970	844	1934	859	1888	861	1821	843	1730	806
	3 (MED)	1940	637	1920	656	1907	675	1870	696	1834	715	1802	730	1759	740	1722	756	1657	748
	2 (MED/LOW)	1688	413	1645	432	1611	451	1575	468	1534	479	1498	497	1461	513	-	-	-	-
	1 (LOW)	1509	327	1477	339	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1. Factory set on medium speed tap.
2. Includes allowances for a wet evaporator coil and 1" filters. Refer to STATIC RESISTANCES Table for resistance values.
3. Bottom Duct application (230 Volts)

Table 13: Belt Drive RPM Selection

Size (Tons)	Model	HP	Max BHP	Motor Sheave	Blower Sheave	5 Turns Open	4 Turns Open	3 Turns Open	2 Turns Open	1 Turn Open	Fully Closed
036	XP	1.5	1.73	1VL44	AK64	805	865	920	980	1035	1095
(3)		1.5	1.73	1VP56	AK66	1115	1170	1225	1280	1335	1390
048	XP	1.5	1.73	1VL44	AK56	930	995	1060	1130	1195	1260
(4)		1.5	1.73	1VP56	AK61	1210	1270	1330	1390	1455	1515
060	XP	1.5	1.73	1VL44	AK56	930	995	1060	1130	1195	1260
(5)		2	2.3	1VP56	AK56	1325	1395	1460	1525	1590	1660

* Field Option Sheave.

Table 14: Indoor Blower Specifications (Belt Drive)

Size (Tons)	Motor					Motor Sheave			Blower Sheave			Belt
	HP	RPM	Eff.	SF	Frame	Datum Dia. (in.)	Bore (in.)	Model	Datum Dia. (in.)	Bore (in.)	Model	
036	1-1/2	1725	0.8	1.15	56	2.8 - 3.8	7/8	1VL44	6.0	1	AK64	A37
(3.0)	1-1/2	1725	0.8	1.15	56	4.0 - 5.0	7/8	1VP56	6.2	1	AK66	A39
048	1-1/2	1725	0.8	1.15	56	2.8 - 3.8	7/8	1VL44	5.2	1	AK56	A36
(4.0)	1-1/2	1725	0.8	1.15	56	4.0 - 5.0	7/8	1VP56	5.7	1	AK61	A38
060	1-1/2	1725	0.8	1.15	56	2.8 - 3.8	7/8	1VL44	5.2	1	AK56	A36
(5.0)	2	1725	0.8	1.15	56	4.0 - 5.0	7/8	1VP56	5.2	1	AK56	A38

Table 15: Power Exhaust Specifications

Model	Voltage	Motor			Motor			Fuse Size	CFM @ 0.1 ESP
		HP	RPM[1]	QTY	LRA	FLA	MCA		
2PE04703025	208/230-1-60	1/2	1725	1	23.7	4.4	5.5	8	1350
2PE04703046	460-1-60	1/2	1725	1	4.1	1.7	2.1	5	1350

1. Motors are multi-tapped and factory wired for high speed.

Checking Supply Air CFM

The RPM of the supply air blower will depend on the required CFM, the unit accessories or options and the static resistances of both the supply and the return air duct systems. With this information, the motor speed tap (direct drive) or the motor pulley number of turns open (belt drive) can be determined from the Blower Performance Data Tables.

⚠ CAUTION

Belt drive blower systems MUST be adjusted to the specific static and CFM requirements for the application. The belt drive blowers are NOT set at the factory for any specific static or CFM. Adjustments of the blower speed and belt tension are REQUIRED. Tighten blower pulley and motor sheave set screws after these adjustments. Re-checking set screws after 10-12 hrs. run time is recommended.

Note the following:

1. The supply air CFM must be within the limitations shown in the Unit Physical Data Table 8.
2. Pulleys can be adjusted in half turn increments.
3. The tension on the belt should be adjusted as shown in the Belt Adjustment Figure 15.
4. Tighten blower pulley and motor sheave set screws after any adjustments. Re-check set screws after 10-12 hrs. run time is recommended.

Start the supply air blower motor. Adjust the resistances in both the supply and the return air duct systems to balance the air distribution throughout the conditioned space. The job specifications may require that this balancing be done by someone other than the equipment installer.

To check the supply air CFM after the initial balancing has been completed:

1. Remove the two 5/16” dot plugs from the blower motor and the filter access panels shown in Figure 7.
2. Insert at least 8" of 1/4 inch tubing into each of these holes for sufficient penetration into the air flow on both sides of the indoor coil.

NOTE: The tubes must be inserted and held in a position perpendicular to the air flow so that velocity pressure will not affect the static pressure readings.

3. Using an inclined manometer, determine the pressure drop across a dry evaporator coil. Since the moisture on an evaporator coil may vary greatly, measuring the pressure drop across a wet coil under field conditions would be inaccurate. To assure a dry coil, the compressors should be deactivated while the test is being run.
4. Knowing the pressure drop across a dry coil, the actual CFM through the unit can be determined from the curve in Pressure Drop vs. Supply Air CFM (Figure 17).

⚠WARNING

Failure to properly adjust the total system air quantity and static pressure can result in extensive system damage.

After readings have been obtained, remove the tubes and reinstall the two 5/16” dot plugs that were removed in Step 1.

NOTE: De-energize the compressors before taking any test measurements to assure a dry indoor coil.

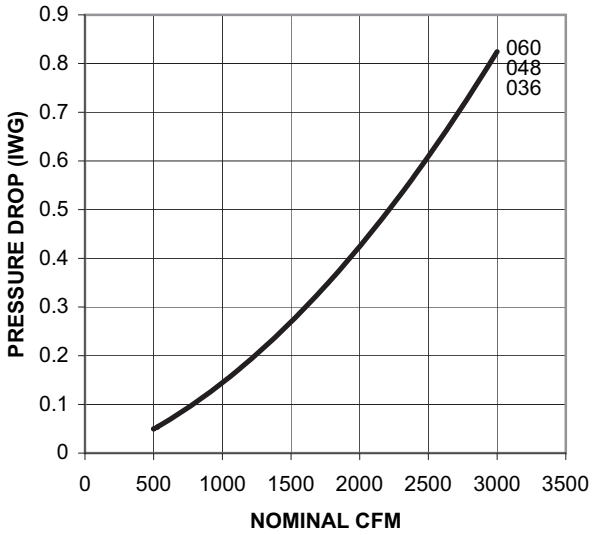


Figure 17: Pressure Drop Across Coil

Table 16: Additional Static Resistance

Size (Tons)	CFM	Economizer[1 2]	Electric Heat kW[1]	
			7 - 15	20 - 30
036 (3.0) 048 (4.0) 060 (5.0)	1000	0.07	0.04	0.06
	1200	0.08	0.05	0.07
	1400	0.09	0.06	0.08
	1600	0.11	0.07	0.09
	1800	0.13	0.08	0.11
	2000	0.15	0.10	0.13
	2200	0.17	0.12	0.15
	2400	0.20	0.14	0.17
	2600	0.23	0.16	0.20
	2800	0.23	0.19	0.23
	3000	0.30	0.22	0.26

1. Deduct these values from the available external static pressure shown in the respective Blower Performance Tables.
2. The pressure drop through the economizer is greater for 100% outdoor air than for 100% return air. If the resistance of the return air duct is less than 0.25 IWG, the unit will deliver less CFM during full economizer operation.

Operation

Sequence Of Operation

For the XP series of units, the thermostat makes a circuit between “R” and “Y1” for the first stage of cooling.

The call is passed to the **Unit Control Board (UCB),** which then determines whether the requested operation is available and, if so, which components to energize.

For heating, the thermostat makes a circuit between “R” and “W1”. The UCB energizes the compressor and condenser fan allowing the unit to run in heating mode. A demand defrost control operates the defrost cycle on all 3 thru 5 ton units.

If at any time a call for both heating and cooling are present, the heating operation will be performed. If operating, the cooling system is halted as with a completion of a call for cooling. Heating always takes priority.

Continuous Blower

By setting the room thermostat fan switch to "ON," the supply air blower will operate continuously.

Intermittent Blower

With the room thermostat fan switch set to "AUTO" and the system switch set to either the "AUTO" or "HEAT" settings, the blower is energized whenever a cooling or heating operation is requested. The blower is energized after any specified delay associated with the operation.

When energized, the indoor blower has a minimum run time of 30 seconds. Additionally, the indoor blower has a delay of 10 seconds between operations.

No Outdoor Air Options

When the thermostat calls for cooling, the low-voltage control circuit from “R” to “Y1” and “G” is completed. The compressor and condenser fan motor are energized. After completing the specified fan on delay for cooling, the UCB will energize the blower motor.

Once the thermostat has been satisfied, it will de-energize Y1. If the compressor has satisfied its minimum run time, the compressor and condenser fan de-energize. Otherwise, the unit operates the cooling system until the minimum run time for the compressor has been completed. After the compressor de-energizes, the blower is stopped following the elapse of the fan off delay for cooling.

To be available, a compressor must not be locked-out due to a high or low-pressure switch or freezestat trip and the anti-short cycle delay (ASCD) must have elapsed.

Economizer With Single Enthalpy Sensor

When the room thermostat calls for cooling, the low voltage control circuit from “R” to “G” and “Y1” is completed. The UCB energizes the blower motor (if the fan switch on the room thermostat is set in the “AUTO” position) and drives the economizer dampers from fully closed to their minimum position. If the enthalpy of the outdoor air is below the setpoint of the enthalpy controller (previously determined), “Y1” energizes the economizer. The dampers will modulate to maintain a constant supply air temperature as monitored by the discharge air sensor. If the outdoor air enthalpy is above the setpoint, “Y1” energizes the compressor and condenser fan motor only.

Once the thermostat has been satisfied, it will de-energize “Y1”. If the compressor has satisfied its minimum run time, the compressor and condenser fan are de-energized. Otherwise, the unit operates the cooling system until the minimum run times for the compressor has been completed. After the compressor de-energizes, the blower is stopped following the elapse of the fan off delay for cooling, and the economizer damper goes to the closed position. If the unit is in continues fan operation the economizer damper goes to the min. position.

Economizer With Dual Enthalpy Sensors

The operation with the dual enthalpy sensors is identical to the single sensor except that a second enthalpy sensor is mounted in the return air. This return air sensor allows the economizer to choose between outdoor air and return air, whichever has the lowest enthalpy value, to provide maximum operating efficiency.

Economizer With Power Exhaust

A unit equipped with an economizer (single or dual enthalpy) and a power exhaust operates as specified above with one addition. The power exhaust motor is energized 45 seconds after the actuator position exceeds the exhaust fan set point on the economizer control. When the power exhaust is operating, the second stage of mechanical cooling will not operate. As always, the "R" to "G" connection provides minimum position but does not provide power exhaust operation.

Motorized Outdoor Air Dampers

This system operation is the same as the units with no outdoor air options with one exception. When the “R” to “G” circuit is complete, the motorized damper drives open to a position set by the thumbwheel on the damper motor. When the “R” to “G” circuit is opened, the damper spring returns fully closed.

Cooling Operation Errors

Each cooling system is monitored for operation outside of the intended parameters. Errors are handled as described below. All system errors override minimum run times for compressors.

High-Pressure Limit Switch

During cooling operation, if a high-pressure limit switch opens, the UCB will de-energize the compressor, initiate the ASCD (Anti-short cycle delay), and stop the condenser fan. If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the compressor.

Should a high-pressure switch open three times within two hours of operation, the UCB will lock-out the associated compressor and flash a code (see Table 19).

Low-Pressure Limit Switch

The low-pressure limit switch is not monitored during the initial 30 seconds of a cooling system's operation. For the following 30 seconds, the UCB will monitor the low-pressure switch to ensure it closes. If the low-pressure switch fails to close after the 30-second monitoring phase, the UCB will de-energize the compressor, initiate the ASCD, and stop the condenser fan.

Once the low-pressure switch has been proven (closed during the 30-second monitor period described above), the UCB will monitor the low-pressure limit switch for any openings. If the low-pressure switch opens for greater than 5 seconds, the UCB will de-energize the compressor, initiate the ASCD, and stop the condenser fan.

If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the compressor.

Should a low-pressure switch open three times within one hour of operation, the UCB will lock-out the compressor and flash a code (Table 19).

Freezestat

During cooling operation, if a freezestat opens, the UCB will de-energize the compressor, initiate the ASCD, and stop the condenser fan. If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the halted compressor.

Should a freezestat open three times within two hours of operation, the UCB will lock-out the associated compressor and flash a code (Table 19).

Low Ambient Cooling

To determine when to operate in low ambient mode, the UCB has a pair of terminals connected to a temperature-activated switch set at 45ºF. When the low ambient switch is closed and the thermostat is calling for cooling, the UCB will operate in the low ambient mode.

Low ambient mode operates the compressors in this manner: 10 minutes on, 5 minutes off. The indoor blower is operated throughout the cycle. The 5-minute off period is necessary to defrost the indoor coil.

Low ambient mode always begins with compressor operation. Compressor minimum run time may extend the minutes of compressor operation. The defrost cycle will begin immediately following the elapse of the minimum run time.

When operating in low ambient mode, the UCB will not lockout the compressors due to a freezestat trip. However, a freezestat trip will de-energize the associated compressor. If the call for cooling is still present at the end of the ASCD and the freezestat has closed, the unit will resume operation.

Safety Controls

The unit control board monitors the following inputs for each cooling system:

1. A suction line freezestat to protect against low evaporator temperatures due to a low airflow or a low return air temperature, (opens at 26 ± 5 °F and resets at 38 ± 5°F).
2. A high-pressure switch to protect against excessive discharge pressures due to a blocked condenser coil or a condenser motor failure, (opens at 625 ± 25 psig).
3. A low-pressure switch to protect against loss of refrigerant charge, (opens at 22 ± 5 psig).

The above pressure switches are hard-soldered to the unit. The refrigeration systems are independently monitored and controlled. On any fault, only the associated system will be affected by any safety/preventive action.

The unit control board monitors the temperature limit switch of electric heat units and the temperature limit switch and the gas valve of gas furnace units.

Compressor Protection

In addition to the external pressure switches, the compressor also has inherent (internal) protection. If there is an abnormal temperature rise in a compressor, the protector will open to shut down the compressor. The UCB incorporates features to minimize compressor wear and damage. An **Anti-Short Cycle Delay (ASCD)** is utilized to prevent operation of a compressor too soon after its previous run. Additionally, a minimum run time is imposed any time a compressor is energized.

The ASCD is initiated on unit start-up and on any compressor reset or lock-out.

Flash Codes

The UCB will initiate a flash code associated with errors within the system. Refer to UNIT CONTROL BOARD FLASH CODES Table 19.

Reset

Remove the call for cooling, by raising thermostat setting higher than the conditioned space temperature. This resets any pressure or freezestat flash codes.

Heating Sequence Of Operations

With or Without Electric Heat

When the thermostat calls for the first stage of heating, the low voltage control circuit is completed between “R” and “W1”. The 24vac signal is passed through the UCB to the “Y” contact on the Defrost Control (DC) assuring the reversing valve cannot be energized, except during defrost. If the ASCD timer is satisfied the UCB will energize compressor contactor M1.

If the compressor alone cannot satisfy the heating requirements, a second stage call from the thermostat completes the circuit between “R” and “W2”. This 24vac signal is passed through the UCB to the electric heat section (if available). The total available kW of electric heat will be energized on a call for “W2”.

Defrost Mode (3 thru 4 Ton)

The demand defrost control implements a temperature differential (”delta-T”) demand defrost algorithm. The heat pump is allowed to operate in the heating mode until the combination of outdoor ambient and outdoor coil temperatures indicate that defrosting is necessary. When coil temperature is below the initiate point for the ambient temperature continuously for 4-1/2 minutes, the heat pump is put into a defrost cycle. This 4-1/2 minute timer eliminates unnecessary defrost cycles caused by refrigeration surges such as those that occur at the start of a heating cycle.

A timed inhibit feature prevents the system from responding to a call for defrost less than 20 minutes after the initiation of the previous defrost. After the 20 minute inhibit time has expired, temperature conditions must call for defrost continuously for 4-1/2 minutes before a defrost cycle is initiated. A temperature inhibit feature prohibits defrost if the coil temperature is above 40°F.

Forced Defrost

A forced-defrost feature puts the system into a defrost period every 6 hours and 4 minutes to recirculate lubricants, unless the coil temperature is above 40°F. All defrost timing occurs only while the compressor is on.

During the defrost mode, the defrost control will provide a 24 volt signal from terminal “W1/66” to the fan control terminal “W2”. This signal will energize electric heat stage 1, if the unit is so equipped.

For trouble shooting purposes, the defrost cycle can be manually initiated by shorting the “TEST” pins together for 5 seconds. Defrost will terminate normally during the “TEST” mode.

Defrost Mode (5 Ton)

As mentioned earlier, the defrost control (DC) utilizes a time/ temperature defrost scheme. The following two conditions must be met before the DC will enter a defrost mode:

The defrost thermostat (SD) must be closed. This normally open thermostat is mounted on the liquid line and is set to close at 28 ± 4°F.

Once the defrost thermostat closes, the defrost control starts a run timer that must be satisfied before defrost can begin. This is accumulated compressor run time. The selection pin is factory set at 60 minutes, but is field adjustable to 30, 60 or 90 minutes.

When the DC enters the defrost mode, it’s on-board defrost relay is powered. This energizes the reversing valve, de-energizes the condenser fan motor and energizes the unit’s optional electric heater. The DC remains in defrost mode until either of the following two conditions is met:

1. The liquid line thermostat is open. It is set to open at 55 ± 4°F.
2. The maximum defrost run time of 10 minutes is met.

Forced Defrost

The processor on the defrost board is only energized when the defrost sensor (DS) is closed.

To create a forced defrost:

1. The DS must either be closed or a jumper must be placed across the DFS terminals on the board.
2. Place a jumper across the test pin terminals on the board.

   Depending on the selected defrost minimum run time of 30, 60 or 90 minutes, the board will go into defrost in 7.5, 15 or 22.5 seconds.

   The DC will remain in defrost until the jumpers across the DS and the test pin terminals are removed.

Once the jumpers are removed, the board then terminates defrost when the DS opens or a maximum of 10 minutes after the test pin jumper is removed, whichever comes first.

Safety Controls

The electric heat control circuit includes the following safety controls:

Temperature Limit Switch (TLs)

This control is located inside the heater compartment and is set to open at the temperature indicated in the Electric Heat Limit Setting Table 17. It resets automatically. The limit switch operates when a high temperature condition, caused by inadequate supply air flow occurs, thus shutting down the heater and energizing the blower.

Table 17: Electric Heat Limit Setting

Voltage	kW	Temperature Limit Switch	Open Temperature °F
208-1-60	5	1	140
	7	1,3	140
	10	1,2,3	140
	15	2,4,6	140
	20	1,2,3,4,5	140
		6	150
	30	1,2,3,4,5,6	150
230-3-60	5	1,2,3	140
	7	1,2,3	140
	10	1,2,3	150
	15	2,4,6	140
	20	1,2,3,4,5,6	150
	30	1,3,5	160
		2,4,6	150
460-3-60	7	2,4,6	140
	10	2,4,6	140
	15	2,4,6	140
	20	3	160
	30	3	150
575-3-60	10	2,4,6	140
	15	2,4,6	140
	20	5	160
	30	5	150

Flash Codes

The UCB will initiate a flash code associated with errors within the system. Refer to UNIT CONTROL BOARD FLASH CODES Table 19.

Reset

Remove the call for heating by lowering the thermostat setting lower than the conditioned space temperature.This resets any flash codes.

Electric Heat Anticipator Setpoints

It is important that the anticipator setpoint be correct. Too high of a setting will result in longer heat cycles and a greater temperature swing in the conditioned space. Reducing the value below the correct setpoint will give shorter “ON” cycles and may result in the lowering of the temperature within the conditioned space. Refer to Table 18 for the required electric heat anticipator setting.

Table 18: Electric Heat Anticipator Setpoints

Heater Kw	Voltage	Setting, Amps	
		TH1	TH2
5	230-1-60 230-3-60	0.024	0.35
7		0.024	0.35
10		0.024	0.35
15		0.024	0.35
20		0.024	0.35
30		0.024	0.35
7	460-3-60	0.024	0.35
10		0.024	0.35
15		0.024	0.35
20		0.024	0.37
30		0.024	0.37
10	575-3-60	0.024	0.35
15		0.024	0.35
20		0.024	0.37
30		0.024	0.37

Start-up (Cooling)

Prestart Check List

After installation has been completed:

1. Check the electrical supply voltage being supplied. Be sure that it is the same as listed on the unit nameplate.
2. Set the room thermostat to the off position.
3. Turn unit electrical power on.
4. Set the room thermostat fan switch to on.
5. Check indoor blower rotation.
   - If blower rotation is in the wrong direction. Refer to Phasing Section in general information section.
   - Check blower drive belt tension.
6. Check the unit supply air (CFM). See “CHECKING SUPPLY AIR CFM” on page 37.
7. Measure evaporator fan motor's amp draw.
8. Set the room thermostat fan switch to off.
9. Turn unit electrical power off.

Operating Instructions

1. Turn unit electrical power on.
2. Set the room thermostat setting to lower than the room temperature.
3. Compressor will energize after the built-in time delay (five minutes).

Post Start Check List

1. Verify proper system pressures.
2. Measure the temperature drop across the evaporator coil.
3. Measure the system Amperage draw across all legs of 3 phase power wires.
4. Measure the condenser fan amp draw.

Shut Down

1. Set the thermostat to highest temperature setting.
2. Turn off the electrical power to the unit.

Troubleshooting

⚠WARNING

Troubleshooting of components may require opening the electrical control box with the power connected to the unit. **Use extreme care when working with live circuits!** Check the unit nameplate for the correct line voltage and set the voltmeter to the correct range before making any connections with line terminals.

When not necessary, shut off all electric power to the unit prior to any of the following maintenance procedures so as to prevent personal injury.

⚠ CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation which could cause injury to person and/or damage unit components. Verify proper operation after servicing.

On calls for cooling, if the compressors are operating but the supply air blower motor does not energize after a short delay (the room thermostat fan switch is in the “AUTO” position).

1. Turn the thermostat fan switch to the ON position. If the supply air blower motor does not energize, go to Step 3.
2. If the blower motor runs with the fan switch in the ON position but will not run after the compressor has energized when the fan switch is in the AUTO position, check the room thermostat for contact between R and G in the AUTO position during calls for cooling.
3. If the supply air blower motor does not energize when the fan switch is set to ON, check that line voltage is being supplied to the contacts of the M2, contactor, and that the contactor is pulled in. Check for loose wiring between the contactor and the supply air blower motor.
4. If M2 is pulled in and voltage is supplied to M2, lightly touch the supply air blower motor housing. If it is hot, the motor may be off on internal protection. Cancel any thermostat calls and set the fan switch to AUTO. Wait for the internal overload to reset. Test again when cool.
5. If M2 is not pulled in, check for 24 volts at the M2 coil. If 24 volts are present at M2 but M2 is not pulled in, replace the contactor.
6. Failing the above, if there is line voltage supplied at M2, M2 is pulled in, and the supply air blower motor still does not operate, replace the motor.
7. If 24 volts is not present at M2, check that 24 volts is present at the UCB supply air blower motor terminal, “FAN”. If 24 volts is present at the FAN, check for loose wiring between the UCB and M2.
8. If 24 volts is not present at the “FAN” terminal, check for 24 volts from the room thermostat. If 24 volts are not present from the room thermostat, check for the following:
   a. Proper operation of the room thermostat (contact between R and G with the fan switch in the ON position and in the AUTO position during operation calls).
   b. Proper wiring between the room thermostat and the UCB.
   c. Loose wiring from the room thermostat to the UCB.
9. If 24 volts is present at the room thermostat but not at the UCB, check for proper wiring between the thermostat and the UCB, i.e. that the thermostat G terminal is connected to the G terminal of the UCB, and for loose wiring.
10. If the thermostat and UCB are properly wired, replace the UCB.

On a call for cooling, the supply air blower motor is operating but the compressor is not (the room thermostat fan switch is in the “AUTO” position).

1. If installed, check the position of the economizer blades. If the blades are open, the economizer is providing free cooling and the compressors will not immediately operate. If both stages of cooling are requested simultaneously and the economizer provides free cooling, following a short delay the compressor will be energized unless it is locked out, unless this option has been disabled through computer communications.
2. If no economizer is installed or the economizer is not opening to provide free cooling and the compressor does not energize on a call for cooling, check for line voltage at the compressor contactor, M1, and that the contactor is pulled in. Check for loose wiring between the contactor and the compressor.
3. If M1 is pulled in and voltage is supplied at M1, lightly touch the compressor housing. If it is hot, the compressor may be off on inherent protection. Cancel any calls for cooling and wait for the internal overload to reset. Test again when cool.
4. If M1 is not pulled in, check for 24 volts at the M1 coil. If 24 volts are present and M1 is not pulled in, replace the contactor.

5. Failing the above, if voltage is supplied at M1, M1 is pulled in, and the compressor still does not operate, replace the compressor.
6. If 24 volts is not present at M1, check for 24 volts at the UCB terminal, C1. If 24 volts is present, check for loose wiring between C1 and the compressor contactor.
7. If 24 volts is not present at the C1 terminal, check for 24 volts from the room thermostat at the UCB Y1 terminal. If 24 volts is not present from the room thermostat, check for the following:
   a. 24 volts at the thermostat Y1 terminal
   b. Proper wiring between the room thermostat and the UCB, i.e. Y1 to Y1, Y2 to Y2
   c. Loose wiring from the room thermostat to the UCB.
8. If 24 volts is present at the UCB Y1 terminal, the compressor may be out due to an open high-pressure switch, low-pressure switch, or freezestat. Check for 24 volts at the HPS1, LPS1, and FS1 terminals of the UCB. If a switch has opened, there should be a voltage potential between the UCB terminals, e.g. if LPS1 has opened, there will be a 24-volt potential between the LPS1 terminals.
9. If 24 volts is present at the UCB Y1 terminal and none of the protection switches have opened, the UCB may have locked out the compressor for repeat trips. The UCB should be flashing an alarm code. If not, press and release the ALARMS button on the UCB. The UCB will flash the last five alarms on the LED. If the compressor is locked out, cancel any call for cooling. This will reset any compressor lock outs.

NOTE: While the above step will reset any lockouts, the compressor may be held off for the ASCD. See the next step.

10. If 24 volts is present at the UCB Y1 terminal and none of the switches are open and the compressor is not locked out, the UCB may have the compressor in an ASCD. Check the LED for an indication of an ASCD cycle. The ASCD should time out within 5 minutes. Press and release the TEST button to reset all ASCDs.
11. If 24 volts is present at the UCB Y1 terminal and the compressor is not out due to a protective switch trip, repeat trip lock out, or ASCD, the economizer terminals of the UCB may be improperly wired. Check for 24 volts at the Y1 “OUT” terminal of the UCB. If 24 volts is present, trace the wiring from Y1 “OUT” for incorrect wiring. If 24 volts is not present at the Y1 “OUT” terminal, the UCB must be replaced.
12. *For units without economizers*: If 24 volts is present at the Y1 OUT terminal, check for 24 volts at the Y1 “ECON” terminal. If 24 volts is not present, check for loose wiring from the Y1 “OUT” terminal to the Mate-N-Lock plug, the jumper in the Mate-N-Lock plug, and in the wiring from the Mate-N-Lock plug to the Y1 “ECON” terminal.
13. *For units with economizers*: If 24 volts is present at the Y1 “OUT” terminal, check for 24 volts at the Y1 “ECON” terminal. If 24 volts is not present, check for loose wiring from the Y1 “OUT” terminal to the Mate-N-Lock plug, a poor connection between the UCB and economizer Mate-N-Lock plugs, loose wiring from the Mate-N-Lock plug to the economizer, back to the Mate-N-Lock plug, and from the Mate-N-Lock plug to the Y1 “ECON” terminal. If nothing is found, the economizer actuator may have faulted and is failing to return the 24-volt “call” to the Y1 “ECON” terminal even though the economizer is not providing free cooling. To test, disconnect the Mate-N-Locks and jumper between the WHITE and YELLOW wires of the UCB’s Mate-N-Lock plug. If the compressor energizes, there is a fault in the economizer wiring or actuator.
14. The UCB can be programmed to lock out compressor operation during free cooling and in low ambient conditions. These options are not enabled by default. Local distributors can test the UCB for this programming.

    For units with factory installed economizers, the UCB is programmed to lock out compressor operation when the LAS set point is reached.

    For units without factory installed or with field installed economizers, the UCB allows compressor operation all the time. This programming can be checked or changed by the local distributor.
15. If none of the above correct the error, replace the UCB.

Unit Flash Codes

Various flash codes are utilized by the unit control board (UCB) to aid in troubleshooting. Flash codes are distinguished by the short on and off cycle used (approximately 200ms on and 200ms off). To show normal operation, the control boards flashes a 1 second on, 1 second off “heartbeat” during normal operation. This is to verify that the UCB is functioning correctly. Do not confuse this with an error flash code. To prevent confusion, a 1-flash, flash code is not used.

Current alarms or active restrictions are flashed on the UCB LED.

- **LAST ERROR** - When this button is pressed and released one time within five seconds, it flashes the last five flash codes on the board’s LED. The most recent alarm is shown first and the oldest alarm is shown last.

  When pressed and released twice within a five second span, the fault history is cleared.
- **TEST RESET** - When this button is pressed and released one time within five seconds, any anti-short cycle delays (ASCD) is by-passed for one cycle.

  When this button is pressed twice within five seconds, any active lockouts are reset.
- **COMM SET UP** - If the board is to be networked with other units, this button is used to set the network address.

  The first time the button is pressed within five seconds, it scans the bus, then assigns itself the first available address {starts at 2}. It then flashes that address one time.

  Pressing the button two times within five seconds causes the control to flash its address.

Pressing the button three times within five seconds forces the control to reset its address to 1, which is the factory default.

Fan On And Off Delays

The fan ON and OFF delays can be field adjusted by pressing a combination of buttons on the UCB.

- **Electric Heat** - Press and release the ***COMM SETUP*** and ***LAST ERROR*** buttons at the same time. The control flashes twice on the LED as the control writes a 0 second ON and a 30 second OFF fan delay to the control's program memory.

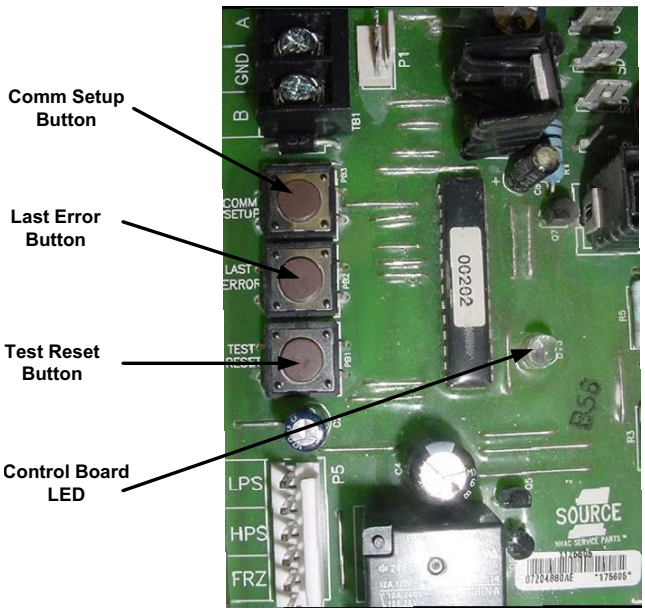


Figure 18: Unit Control Board

Table 19: Unit Control Board Flash Codes

Flash Code	Description
On Steady	Control Failure - Replace Control
Heart Beat	Normal Operation
1 Flash	Not Applicable
2 Flashes	Control waiting ASCD[1]
3 Flashes	HPS1 - Compressor Lock out
5 Flashes	LPS1 - Compressor Lock out
7 Flashes	FS1 - Compressor Lock out
10 Flashes	Compressors Locked Out On Low Outdoor Air Temperature[1]
11 Flashes	Compressors Locked Out Because The Economizer Is Using Free Cooling[1]
13 Flashes	Compressor Held Off Due To Low Voltage[1]
14 Flashes	EEPROM Storage Failure (Control Failure)
OFF	No Power or Control Failure

1. These flash codes do not represent alarms.

Maintenance

Normal Maintenance

⚠ CAUTION

Prior to any of the following maintenance procedures, shut off all electric power to the unit to prevent personal injury.

Filters

Inspect once a month. Replace disposable or clean permanent type as necessary. DO NOT replace permanent type with disposable. The dimensional size of the replacement filter must be the same as the replaced filter.

Motors

Outdoor fan motors are permanently lubricated and require no maintenance.

Indoor Blower Motor and Drive - The indoor blower motor features ball bearings that do not require periodic lubrication.

⚠ WARNING

Perform all maintenance operations on the blower motor with electric power disconnected from the unit.

On an annual basis, check the motor for accumulations of dust, etc. that may block the cooling slots in the motor shell. Check for loose, damaged or misaligned drive components. Check that all mounting bolts are tight. Replace defective parts as required.

Outdoor Coil

Dirt should not be allowed to accumulate on the outdoor coil surface or other parts in the air circuit. Cleaning should be as often as necessary to keep coil clean. Use a brush, vacuum cleaner attachment, or other suitable means. If water is used to clean coil, be sure electric power to the unit is shut off prior to cleaning.

NOTE: Exercise care when cleaning the coil so that the coil fins are not damaged.

444463-YIM-D-0311
Supersedes: 444463-YIM-C-0111

Johnson Controls Unitary Products
5005 York Drive
Norman, OK 73069